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A
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ON THE
DISEASES OF THE EYE.

BY

W. LAWRENCE, F.R.S.

SURGEON TO ST. BARTHOLOMEW'S HOSPITAL, AND LECTURER ON SURGERY
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ADVERTISEMENT.

THE basis of the following Treatise consists of the Lectures on the Anatomy, Physiology, and Diseases of the Eye, which I delivered at the London Ophthalmic Infirmary. The subjects are now considered in greater detail; the opinions and experience of others are quoted and examined; and cases are introduced, for practical illustration, wherever it could be done with advantage.

To have treated of the Anatomy and Physiology of the Eye at full length, would have been inconsistent with the limits and objects of this work. The short account of those subjects given in the lectures, has been retained, merely for the purpose of introduction and explanation, in reference to the pathological and practical part of the Treatise.

W. LAWRENCE.

Whitehall Place, June 29, 1833.

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TREATISE

ON

DISEASES OF THE EYE.

INTRODUCTION.

The object of the following pages is to describe the nature and treatment of diseases of the eye, including, under that expression, not only the globe itself, but the several auxiliary parts, called its appendages. The anatomy and physiology of the organs will be considered merely in reference to practical purposes.

It is hardly necessary to enlarge on the importance of the subject, or to prove formally that a knowledge of it is indispensable to medical practitioners. Every one feels that sight is the most valuable of the senses; that it not only is, in itself, the most important inlet of knowledge, the most valuable medium of our communication with surrounding persons and objects, but also that it is essential to the full enjoyment of our other senses; to the free exercise of almost all our other faculties and endowments; so that these lose more than half their value when sight is gone. Hence blindness is one of the greatest calamities that can befal human nature, short of death; and some would perhaps prefer the termination of existence to its continuance in the solitary and dependent state, to which life is reduced by the privation of this precious sense.

Loss of sight is the greatest misfortune even to the rich, who can alleviate it by purchasing the aid and services of others. How much more severely must it be felt by the poor, by the middle and lower classes of society, that is, by the great majority of mankind; who, being rendered incapable of labour, and having their minds uncultivated, find their existence reduced to a dreary blank, dark, solitary, and cheerless, burthensome to themselves and to those around them. Even our great poet, who might have been supposed to find every alleviation and resource that such an affliction admits of, in his highly-gifted mind, and the exhaustless stores of knowledge with which it was furnished, repeatedly reverts to his blindness, and always in a tone of anguish and despondency characteristic of recent misfortune :—

> "Thus with the year,
> Seasons return ; but not to me returns
> Day, or the sweet approach of eve or morn,
> Or sight of vernal bloom, or summer's rose,
> Or flocks, or herds, or human face divine ;
> But cloud instead, and ever-during dark
> Surround me, from the cheerful ways of men
> Cut off, and for the book of knowledge fair
> Presented with a universal blank
> Of Nature's works, to me expunged and rased,
> And wisdom at one entrance quite shut out."

It often depends on the surgeon whether the patient shall retain or lose, recover or remain bereft of vision. Common external inflammation of the eye, if neglected or improperly treated, by rendering the transparent anterior portion of the organ more or less opaque, proportionally injures vision; inflammation of the iris, when unchecked, causes contraction of the pupil and deposition of lymph in the aperture, which prevents the passage of light into the eye. Affection of the nervous structure, if not arrested in its beginning, terminates inevitably in diminution or loss of sight. Such distressing results have too often been promoted by modes of treatment, in favour of which the sanction of names that have enjoyed public confidence might be adduced. The success of operations for cataract, or artificial pupil, depends entirely on the knowledge, discrimination, and dexterity of the operator. The cases now alluded to are matters of daily occurrence, and make up the bulk of ophthalmic practice. The serious responsibility, which this view of the subject unfolds, will impel every conscientious man to turn his anxious attention to the affections of this important organ, and to embrace all opportunities of acquiring that knowledge which will enable him to act decisively and effectually on occasions of such momentous consequence.

If there are any, to whom the pleasure connected with the acquisition of knowledge, the satisfaction flowing from the consciousness of important duties rightly performed, and the gratitude so warmly expressed for the inestimable benefits of averting blindness or restoring sight, should not prove an incentive sufficiently powerful to the study of ophthalmic medicine and surgery, their case must be deemed desperate; unless, indeed, their minds, insensible to higher feelings and nobler motives, should obey the impulse of self-interest and fear; unless they should be affected by the prospect of disgrace and injury, which ignorance and its inseparable blunders must entail. The consequences of wrong treatment cannot be concealed here, as in the obscure affections of internal organs; the visible changes of structure are obvious to external observation, and the unfortunate individual, whose sight is injured or destroyed by unskilful treatment, serves as a lasting memorial of the incapacity and rashness to which he owes his misfortune. The study of diseases of the eye is therefore now justly regarded as an essential part of general medical education; but it is more particularly so to country practitioners, who are thrown entirely on their own resources; who cannot, as in the metropolis, and some large cities, call in the aid of superior talent and knowledge.

Although the importance of the subject must be admitted, it may be doubted whether the ophthalmic branch ought to be separated from the rest of medicine and surgery, as it must be, to a certain extent, by devoting to it separate courses of lectures and treatises, and by instituting ophthalmic hospitals. The diseases of the eye, in general hospitals, are inadequate, from the smallness of their number, to the purposes of practical study, particularly that of exemplifying the various operations. Thus these institutions have been inefficient in reference to this important department. As the general body of surgeons did not understand diseases of the eye, the public naturally resorted to oculists, who, seeing such cases in greater numbers, became better acquainted with the symptoms, diagnosis, and treatment; and especially more skilful in the operative department. At the same time, the subject being imperfectly understood, was neglected in the general surgical courses, in which many important affections were entirely unnoticed, and the whole very inadequately explained. Thus students, who resorted to London for the completion of their professional studies, had really no means of learning this important department of the profession, which was tacitly abandoned, even by the hospital surgeons, and turned over to the oculists. The latter not being conversant with the principles derived from anatomy, physiology, and general pathology, attended merely to the organ, and relied almost exclusively on what is comparatively of little importance, local treatment. Hence ophthalmic surgery being in a manner dismembered from the general science, was reduced to a very low ebb. Until within a few years, it was in this country, at least, in a state of almost total darkness.

It thus became desirable to establish an express and distinct school for ophthalmic surgery; not because the principles of treatment differ from those applicable to disease in general; nor because any peculiar mode of study is required; but in order to supply a deficiency in the existing sources of professional instruction; to provide, for the diseases of this important organ, those means of information which the general hospitals neither do, nor could provide, consistently with the requisite attention to their other important objects. This proceeding, which at first view seems calculated to complete and perpetuate the separation, was the only rational mode of re-uniting ophthalmic practice to general surgery.

It was the object of the London ophthalmic infirmary to apply the general principles of pathology and therapeutics to the elucidation and treatment of diseases of the eye. Hence it is a law of the establishment, that the medical officers of the institution shall be selected from those who have been regularly educated as physicians and surgeons. The great field of observation which it affords has been thrown open to the public; thus enabling the general body of the profession, and particularly medical students, to acquire easily, and in a short time, a full knowledge of this department. The opportunities afforded at this institution are not intended nor calculated to make oculists; but to impart to surgeons and physicians a knowledge of ophthalmic disease.

It may be doubted whether the affections of the eye afford matter for a separate course of lectures or treatise. The eye, although small in bulk, is complicated in structure. It is made up of several distinct or dissimilar tissues, and it exhibits all the affections to which each of these is liable. Although its component structures are for the most part analogous to what we meet with in other parts of the body, and consequently must be subject to morbid affections essentially similar to those occurring elsewhere, yet the office and form of the organ, the union of its component parts, and the nature of many of them, are so peculiar, as to give a strong character of individuality to its diseases. We do not, at the first view, recognise in affections of the eye the same diseased processes with which we are familiar in other parts; we seem to be contemplating something peculiar and individual, and this more especially in the diseases of the peculiar tissues. This individual and distinct character of ophthalmic diseases both accounts for their having been detached and considered as a separate branch of surgery, and, in conjunction with their number, justifies the appropriating to them distinct courses of lectures and treatises. The extent of the subject may be estimated from the circumstance that Professor BEER, of Vienna, occupied in his course of instruction ten months, giving five or six lectures weekly. His course, too, seems to have been on the practical part of the subject; for he is styled professor of practical ophthalmology; while another celebrated man, PROCHASKA, was professor of general ophthalmology in the same school.

The course of proceeding in learning the diseases of the eye, must be the same as that for disease in general. The art of treating diseases, or medicine, taken in its most extensive sense, is founded on the sciences of anatomy, physiology, pathology, and therapeutics; in other words, a knowledge of the healthy structure and function must be first obtained; then that of diseased structure and function; and, lastly, the external agencies capable of influencing the body, so as to remove disease or restore health, must be studied.

The more thoroughly any organ has been investigated, anatomically, physiologically, and pathologically, the better shall we be prepared to treat its diseases. In this respect the eye is advantageously circumstanced; its anatomy is well known; its physiology clearly made out. A considerable portion of the organ is external, and the transparency of the front enables us to see much of its interior. We can observe the phenomena of disease, and the effect of remedies in some of its internal structures, in such parts as are elsewhere hidden from our view. The observations thus made on the eye are applicable to the illustration of disease and treatment in other organs. Hence if the general principles of medical science throw light on ophthalmic affections, the history and progress of the latter reciprocally afford valuable data for general pathology.

But, can the diseases of any organ be well studied alone? Can they advantageously be made the subject of detached and separate investigation and treatment? The numerous organs which make up the human body, although various in structure and office, are all intimately connected and mutually dependent. They are merely subordinate parts of one great machine; and they all concur, each in its own way, in producing one general result, the life of the individual. All the leading arrangements are calculated to give a character of unity to the organization and living actions of our frame. There is a common source of nutrition for the whole body; a single centre of circulation; hence all parts are immediately dependent, for their nourishment and growth, and for the materials of their various exertions, on the digestive organs and the circulating system. There is a common place of union for sensations and volitions: the nervous system associates the actions of the various organs, and combines them for the common purposes of the economy; by means of it, the various organs *co-operate* in the healthy state, and suffer together, or *sympathise* in disease. Thus the individual organs are not independent. The causes of their natural functions, and of those deviations which constitute disease, are not to be found within themselves, but mostly in the state of the constitution, or in that of some leading system of organs. Hence, in order to understand any part of the body, you must know the whole; and this holds equally good in disease as in health. Suppose a person complains of weak sight, we shall not be able to remedy the defect if we attend to the eye only, for probably there may be no visible alteration in the organ. We must look to the state of the circulation in the head, to the condition of the digestive organs; we must inquire into the patient's habits, into his diet, into his general mode of living, as well as into the causes which may be acting on the eye. Until this analysis has been made, we cannot know the causes of disease, nor can we arrive at clear grounds of treatment. We ultimately find that the eye must be cured, not by any direct or local measures, but by those of general influence; by loss of blood, purging, change of diet, and of other habits.

In such a system, then, of intricate connexion and mutual influence, each part will be best understood by him who has the clearest notions of the general economy. Even the practical treatment is most judiciously conducted by those who are in the habit of treating disease generally; who do not confine their attention to the part. This confinement is prejudicial, by producing and confirming habits of partial and narrow views, by leading to neglect of mutual relations and influences, by encouraging local treatment. Exclusive attention to a small corner of the animal structure, causes a confinement of mental vision, analogous to the nearsightedness which mechanics contract by constantly poring over the minute objects of their attention. All the habits of the oculist lead to a separation and insulation of the organ. The part is detached from the system, treated by washes, drops, ointments; and this inefficient trifling impedes the progress of ophthalmic surgery. We want, instead of this, general and comprehensive views, the aid of analogy and contrast; the whole field of medicine and surgery must be laid under contribution, for the principles which are to guide us in learning the nature and treatment of ophthalmic disease. Professed oculists have done little for the science, either here or abroad. The only real and valuable improvements have proceeded from men of extensive anatomical knowledge, and of great general insight into disease.

A question has been raised, whether a minute knowledge of anatomy is necessary to surgeons? and pains have been taken to show that it is not. The persons who have given themselves this trouble seem to have been afraid that we should study anatomy too deeply. My acquaintance with the profession has not inspired me with the smallest apprehension of the kind. I have always been surprised at hearing an argument raised on this subject. If a man, who undertakes to cure the defects and disorders of a machine, says that his remedies are of such a kind as not to require a minute acquaintance with its construction, we should not have much confidence in his proceedings. I cannot think of calculating with how small a stock of scientific knowledge it might be possible to carry on the trade of surgery. The health, the limbs, the lives of our fellow-creatures are entrusted to our care, with a confidence in our knowledge, skill, and humanity; our utmost exertions, and most anxious toil after information, will not do more than enable us to justify such confidence. What kind of feelings, what conscience can the man possess, who can plunge an instrument into the human body without knowing what he may divide or injure? who can operate without that full anatomical knowledge that will enable him to meet every emergency? How could he bear his own reflections, if he should see a patient seriously and permanently injured in consequence of his ignorance and rashness? At all events, minute anatomical knowledge is necessary to an acquaintance with diseases of the eye, especially in the important subject of diagnosis, and in operations.

History.—The separation of the ophthalmic department from the rest of surgical practice, has generally been considered of recent occurrence; it is, on the contrary, very ancient, and perhaps coëval with medicine itself. Among the Egyptians, to whom we trace the origin of arts and sciences, each class of diseases had its physician; and we find from HERODOTUS, that CYRUS sent to AMASIS, the king of Egypt, for an oculist. The Greeks and the Romans had their oculists, as is evident, not only from their writings, but from the inscriptions on ancient marbles and seals. That Augustus and Tiberius were thus provided is apparent from the following inscriptions:—*P. Attius Atimetus Augusti medicus ab oculis; Tit. Lyrius Tiberii medicus ocularius.*[*] There is no doubt that oculists were at least as numerous in ancient Rome as in any modern city.

The Greeks, the Romans, and the Arabians were ignorant of anatomy, and could not, therefore, be acquainted with the essential nature of disease, that is, the altered structure of organs; nor connect with those changes, which really constitute disease, their appropriate external signs or symptoms. This disadvantage, however, is not so great in diseases of the eye as in many other affections, because most of them are externally visible, and obvious enough without anatomical knowledge. Hence the Greeks, who were good observers of nature, had noticed most forms of ophthalmic disease, in many instances described them well and distinguished them accurately. The extent of their knowledge is evidenced by the imperishable records of language; for many of the diseases still bear the names given to them by the Greek writers. CELSUS contains a summary of all that was known in his time. Although he was ignorant of the seat of cataract, he has described the operation of couching excellently and concisely, not omitting the important subjects of previous preparation and after treatment, for which his directions are judicious.

In the fifteenth, sixteenth, seventeenth, and first half of the eighteenth century, the management of the diseases of the eye was left to quacks, to mountebanks, and itinerant practitioners. There were many of them, both in our own country and on the continent. It is not, however, worth while to draw their names and their writings from the oblivion to which they have been quietly consigned. The French writers on this subject, MAITRE-JAN, ST. YVES, and JANIN, were more respectable than their cotemporary brethren in other countries. The anatomy of the organ began to be more carefully cultivated by the Germans about the middle of the 18th century, when ZINN, Professor of Anatomy at Gottingen, published his excellent *Descriptio Anatomica Oculi Humani.* At a more recent period, SOEMMERRING produced his *Icones Oculi Humani*, a work of unrivalled beauty and accuracy, exhibiting an almost perfect set of engravings.

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[*] These, and other similar inscriptions, are quoted by HALLER from GRUTER and other authorities. WALCH has collected every thing relating to the subject in his *Sigillum Medici Ocularii Romani*; Jenæ, 1772. 8vo. HALLER, *Bibl. Chir.* v. 1, lib. 1, § 24.

The pathology of the eye was not much improved until within recent times. BOERHAAVE made an attempt on the subject, but his work, *De Morbis Oculorum*, is very imperfect; indeed some idea may be formed of the amount of his pathological knowledge, from his assertion about mercury dissolving cataracts; he says, "*mercurius sæpe perfectas cataractas solvit.*" The Germans have had the greatest share in advancing our knowledge of ophthalmic diseases. RICHTER, Professor of Surgery at Göttingen, deservedly enjoyed the highest reputation in Germany, both for his general knowledge of the subject, and for his acquaintance with diseases of the eye, to which he paid great attention in his practice and writings. In his *Chirurgische Bibliothek (Bibliotheca Chirurgica)* which takes up the subject from the point where HALLER's *Bibliotheca Chirurgica* leaves off, and comes down to 1797, he has carefully analysed all new publications on ophthalmic disease. The best account of the subject, at the time of its publication, is to be found in his *Anfangsgründe der Wundarzneykunst, (Elements of Surgery,)* of which the whole third volume and part of the second are devoted to diseases of the eye.

But the most important era in the history of ophthalmic surgery is the establishment of the Vienna school of ophthalmology. The Austrians have not only the honour of having instituted the first public establishment expressly appropriated to the advancement of this hitherto neglected branch of the profession, but of having preceded all the rest of Europe by many years. The views which directed the formation of this institution were so judicious, and the persons successively appointed to preside over it showed themselves so well fitted for the task, by their talents and knowledge, that the ophthalmic department of surgery has probably been more benefited by this school, than by the previous exertions of all other countries. The establishment owes its origin to Joseph Barth, a native of Malta, who repaired to Vienna, in order to indulge a strong inclination, which he had felt from his earlier years, for the study of anatomy and surgery. His attention was accidentally directed to diseases of the eye, from seeing many persons in a state of hopeless blindness. His proficiency in this department was soon well known; and hence he was appointed lecturer on ophthalmic surgery in the university of Vienna, in 1773. Soon afterwards, certain wards were assigned for ophthalmic patients, in the general civil hospital, and a regular course of oral and clinical instruction was established. Barth wrote nothing except a short tract on the mode of performing extraction without an assistant; but he is considered to have set the example of those new and more correct views of ophthalmic disease, which are disclosed in the works of various German writers.[*]

Schmidt, who was educated by Barth, published a work on diseases of the lachrymal organs, and a valuable essay on Iritis. He also edited, in conjunction with Professor Himly, of Gottingen, an interesting periodical, devoted to ophthalmology *(Ophthalmologische Bibliothek,)* of which three volumes appeared, from 1801 to 1807.

Beer is more generally known than either Barth or Schmidt, as he was professor of ophthalmic medicine in the university of Vienna, for many years, at a time when the high reputation of the school attracted students from all parts of Europe, and as he published many works. The last and principal of these,[†] in 2 vols. 8vo., 1812 and 1817, devoted to the history, pathology, treatment, and operative surgery of the eye, was the most comprehensive work on the subject at the time of its publication. It contains accurate descriptions and histories, and consequently sound diagnostic precepts; but I cannot speak so favourably of the pathology and treatment. The compendium of Weller,* which was translated by the late Dr. Monteath of Glasgow, is chiefly founded on the work of Beer.†

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[*] Beer has given a biographical account of Barth, in the *Medicinische Jahrbücher*, vol. v. p. 169.

[†] *Lehre von den Augenkrankheiten, als Leitfaden zu seiner offentlichen Vorlesungen.*

They who are inclined to study the history of ophthalmology, will find assistance from a work of Beer, on the plan of Haller's *Bibliotheca Chirurgica.* It is in German, with a German and a Latin title. The latter is *Bibliotheca Ophthalmica, in qua Scripta ad Morbos Oculorum facientia, a rerum initiis usque ad finem anni* 1797, *breviter recensentur:* it is in three thin volumes 4to. In his *Syntagma de Ophthalmologia veterum*, Wallroth has brought together, from the earliest writers, all that they have said respecting the anatomy, physiology, and diseases of the eye.

Professor Himly published, in 1800, his observations on the effect of certain narcotics in dilating the pupil, and on the advantages to be derived from their use in various diseases and operations on the eye.

Langenbeck, professor of anatomy and surgery at Göttingen, where he succeeded Richter, has kept up the reputation of the university for general and ophthalmic surgery. In his *Chirurgische Bibliothek*, which begins from the termination of Richter's, and which, in a second series, under the title of *Neue Chirurgische Bibliothek*, has been continued nearly to the present time, he has noticed and analyzed all new books on diseases of the eye.

The *Journal der Chirurgie und Augen-heilkunde* of Graefe and Walther, which has been regularly published since 1820, and the *Magazin* of Rust, contain numerous contributions and notices respecting this department of surgery. In 1830, Professor Ammon of Dresden began the publication of a quarterly periodical, devoted to this subject exclusively, under the title of *Zeitschrift für die Ophthalmologie:* six numbers have appeared. From these sources a knowledge may be obtained of the numerous publications, which have appeared in Germany, on this apparently favourite subject. I cannot pretend to notice them in detail; but shall refer to those of the greatest value and importance in treating of particular subjects. I will only mention two recently published general and comprehensive works by authors of experience and reputation; viz. the *Handbuch der Theoretischen und Praktischen Augen-heilkunde*, in 3 vols. 8vo. by A. Rosas, the present professor of ophthalmic medicine in the university of Vienna; and the *Lehre von den Augenkrankheiten* of J. C. Juengken, in one vol. 8vo. of nearly one thousand closely printed pages. The latter author had previously published

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* *Die Krankheiten des menschlichen Auges, ein Praktisches Handbuch für Angehende ärtze.* The third edition, which is considerably enlarged, bears date, *Berlin*, 1826.

† In the first volume of the *Quarterly Journal of Foreign Medicine and Surgery*, there is an interesting description of the Medical School of Vienna, in which the arrangements of the ophthalmic department are particularly noticed.

Beer has given a minute account of the ophthalmic clinical department, (*augen clinik*,) according to its new arrangement in 1812, in the *Medicinische Jahrbücher des Kaiserl. Königl. Oesterreichischen Staates;* vol. iv. st. 4, p. 157—173.

(in 1829) a volume nearly as large on the operative surgery of the eye.

The first impulse to the scientific study of ophthalmic medicine and surgery in England, was given by the London Ophthalmic Infirmary, which was established in 1804, but not thrown open to students for the purposes of observation and instruction till 1810. Mr. SAUNDERS, who founded it, in conjunction with Dr. FARRE, had received a regular education in anatomy and surgery at St. Thomas's and Guy's Hospitals. We are indebted to him for the important improvement of operating for cataract on infants; and his instructive posthumous observations, edited by his friend and colleague,* leave no doubt that, if his life had been spared, he would have done much more for the improvement of the science.

Dr. FARRE set the example, at this infirmary, of applying the general principles of pathology and therapeutics to the elucidation and treatment of ophthalmic diseases. In the clinical illustration of cases, the exposition of curative indications, and simplicity of treatment, he could not be surpassed. All who have had the advantage of his instructions will remember them with gratitude and respect; and will regret that he has not communicated to the public, through the press, the interesting results of his long practice, his close observation, and mature reflection. The example of the Vienna Ophthalmic School has been followed in most of the large towns of Germany; while that of the London Ophthalmic Infirmary has led to the formation of similar institutions in many parts of England, so that ample opportunities now exist for the relief and study of ophthalmic diseases.

SCARPA's Observations on the principal Diseases of the Eye, which have been translated into English by Mr. BRIGGS, were considered a valuable contribution to surgical literature, when they first appeared (in 1801.) They are far behind the present state of knowledge on the subject.

I shall have occasion, in the following pages, to refer to the writings of living English authors, whom I do not mention here, because they are sufficiently known to the public.

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* *A Treatise on some Practical Points relating to the Diseases of the Eye*, by the late J. C. SAUNDERS. Second Edition. 1816.

ANATOMY OF THE EYE-BALL.

THE human eye is very nearly spherical, and hence have arisen the expressions applied to it in English, of *globe*, *ball*, and *apple* of the eye, and the corresponding terms in other languages; the Germans speak of the *eye-apple*, in the same sense as we use *eye-ball*. It represents a sphere, with a deficiency in front, occupied by the segment of a smaller sphere. A vertical section, dividing it into an anterior and a posterior half, presents a circular outline; but a similar division from before, backwards, exhibits a posterior division, which is part of a larger sphere, and an anterior, which is a small segment of a smaller sphere. The transverse is rather less than the antero-posterior diameter (or axis) of the globe. The latter is said to measure, in the adult, nine lines; the former eight and three quarters. The real size of the eye varies little in different individuals: the apparent differences depend on the size of the palpebral fissure, and the depth at which the eye-ball is placed in the orbit.

The essential constituents of the eye are, transparent media to refract the rays of light; a nervous expansion to receive the impression produced by the rays thus refracted; and certain membranous opaque coverings, surrounding, connecting, and protecting the foregoing parts. The eye has been technically described as composed of *coats* and *humors*. The coats, tunics or membranes, are the membranous coverings and the nervous expansion; the humors are the transparent media, with the exception of the cornea, which belongs to the coats.

The external stratum of the globe is composed of the sclerotica and cornea; the latter being the anterior transparent part, and the former covering the rest of the eye. When these are removed, we see a membranous covering, distinguished by its deep brown colour, the choroid coat, equal in extent to the sclerotica; to this is closely united, in front, the iris, which is placed at a short distance behind the cornea, and perforated near its centre by a round opening, called the pupil, for admitting the light into the interior of the eye; the removal of the choroid exposes the retina, or the nervous expansion. The three coverings just enumerated, i. e. the sclerotica with the cornea, the choroid with the iris, and the retina, are arranged one within the other, concentrically, like the layers of an onion: they may be called respectively, the fibrous, vascular, and nervous strata of the eye-ball.

The humors are three,—1st. the *vitreus*, which fills the whole concavity of the retina, and forms about four-fifths of the entire bulk of the globe; 2dly. the *crystalline*, called also crystalline lens, a nearly spherical body, imbedded in the front of the vitreus humor; 3dly. the *aqueus*, a small quantity of clear water, filling up the space between the cornea and the front of the crystalline lens, in which space the iris is situated. Only the external or fibrous layer is complete, that is, closed in all directions; the vascular layer is perforated in front by the pupil; and the nervous leaves a still greater deficiency, which is partly filled by the zonula ciliaris.

The membranous layers circumscribe a space, which may be called the cavity of the eye-ball, and which is subdivided into three unequal compartments; the posterior, and largest, bounded by the retina and the zonula ciliaris, contains the vitreus humor, with the imbedded lens; the two anterior, called the *chambers* of the eye, are inclosed by the cornea, crystalline, and ciliary processes, separated by the iris, through the pupillary aperture of which they communicate, and filled with the aqueus humor.

Having thus mentioned, in a general way, the parts which make up the globe of the eye, I shall make a few observations on the structure of each, with the view of rendering the description of their morbid affections more intelligible.

Sclerotica.—In dissecting and examining the eye-ball, we observe that it does not collapse, but that it retains its figure; this depends on its external investment or sclerotic coat (*Albuginea; tunica fibrosa; Lederhaut Germ.*) The word *sclerotica*, which is of Greek extraction, means hard; the sclerotic coat, therefore, is the firm covering of the eye; it is, in fact, the most dense, compact, and unyielding texture in the organ. The cornea resembles it in compactness, density, and consequent firmness, though it is perfectly transparent, while the sclerotic is entirely opaque. In the older writers the term cornea is applied to both these structures; the cornea, properly so called, being denominated cornea lucida; and the sclerotic, cornea opaca. The firmness of the sclerotic is sufficient for it to retain its figure when divided and emptied of its contents; small portions cut out of the membrane preserve their form, and regain it immediately on the pressure being removed, after they have been squeezed together. When this coat is removed, the other component parts of the globe are so much softer and more delicate in their texture, that the ball no longer retains its regular figure. The sclerotic coat belongs to that description of membrane which anatomists call fibrous, such as the dura mater and periosteum. It is made up of the same kind of fibres which compose the tendons and ligaments; and these fibres are so closely compacted and interwoven, that, in the ordinary state of the part, they can scarcely be distinguished. If, however, you dissect it carefully, you will observe, in some parts, the glistening, shining aspect, which denotes a fibrous structure; while in many animals, the fibres being more loosely interwoven, are quite obvious, and in certain forms of disease, when the coat is distended, and rendered thinner, the fibrous structure is very clear. This organization gives the sclerotica that firmness which fits it for covering and protecting the softer and more delicate parts of the globe. It has nothing to do with vision, but is merely subservient to the purpose of supporting, connecting, and protecting the more vascular and delicate parts composing the interior of the globe. The density of structure and resistance of the sclerotic are so considerable, that no force, which can be applied with the fingers or forceps, will lacerate it; when, therefore, the vascular parts within the globe are actively inflamed, this coat becomes so exceedingly tense, as almost to convey the idea of the hardness of stone. The anterior part of the sclerotic is thinner than the posterior part; still this is sufficiently firm to retain its form when separated from the rest of the eye, and we cannot tear it with the fingers or forceps. The external surface of the sclerotic coat is rough and cellular, and affords attachment to the tendons of the muscles which move the eye; these tendons are fixed to it, in the same way as tendons are attached to bones in other situations. The internal surface of the sclerotica is smooth, connected to the choroid by short and soft cellular threads, tinged by the choroid pigment, and hence sometimes called *lamina scleroticæ fusca*. There is no distinct layer, though some regard the surface as of serous nature, analogous to that of the dura mater.* The opposed surfaces of the sclerotica and choroid have a moist appearance, though we do not observe any distinct fluid in them. The substance of the membrane is quite white, without any appearance of red vessels. In the healthy state it seems to contain no vessels circulating red blood. It is indeed perforated by arteries and veins belonging to the interior of the globe; but I speak of vessels distributed in its substance; and in this respect it resembles other fibrous membranes.

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* Frankel in Ammon's *Zeitschrift*, v. i. p. 13.

Cornea.—The *cornea*,[*] which covers one sixth of the globe, differs widely in appearance from the sclerotica, but resembles it in the firmness and resistance of its structure. Thus it is fitted to protect the exposed anterior portion of the eye, while its perfect transparency allows the free passage of light into the interior of the globe. No force applied by the fingers or forceps can lacerate it, although externally it appears a delicate kind of membrane.

The cornea and sclerotic are so firmly united, that they may, to all intents and purposes, be considered as one continued investment of the eye; as constituting a kind of case for lodging and protecting the more delicate essential structures of the organ. They may, indeed, be separated by long maceration, but in the recent subject, the resistance is as great at the line of junction as at any other part, and we may consider them as consolidated into one substance. The sclerotica is brought to a thin edge at its anterior termination, and the circumference of the cornea ends by a similar margin; but the former is bevilled off on the inside, and the latter on the outside, so that the sclerotica overlaps the cornea at the point of union. Hence the circumference of the cornea is smaller externally than internally: hence, too, the anterior chamber extends beyond the external circumference of the cornea. The latter, however, differs in structure from the sclerotic; it is composed of several layers, connected by cellular tissue, in the interstices of which there is a small quantity of clear fluid. The latter can be squeezed out in minute drops, when the cornea of a recent eye is divided. If we make an incision into the substance, we can turn back with the forceps several successive laminæ. The facility with which they are separated in such a dissection, and the freedom with which they glide over each other, when squeezed between the finger and thumb, show that they are loosely connected together. The texture of the layers, when thus torn up, has a fibrous appearance; and we may probably refer the cornea to that class of structures: it agrees with them in the entire absence of vessels circulating coloured fluids, perfect transparency being essential to its office of transmitting light. Pressure on the globe (after death) renders the cornea opaque, more or less completely according to the degree of force employed; when the pressure is remitted, it again becomes transparent. In thickness it is equal to the thickest portion of the sclerotica. In resistance to the knife, it may be compared to parts of cartilaginous structure; it is so firm that we are obliged to use some force in penetrating it with the knife or needle. When we first operate on the eye, we find much greater resistance to the entry of an instrument than the transparency of the parts would have led us to anticipate. The laminated structure, and the loose connexion of the layers, lead to another risk, namely, that of the point of an instrument passing between, instead of going completely through them. The density and compactness of the cornea, the resistance which it consequently offers, and its being composed of several distinct laminæ, are circumstances which should be constantly borne in mind in operating on this part.

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[*] Chelius, *über die durchsichtige hornhaut*, Carlsruhe, 1818; Clemens, *tunicæ corneæ, et humoris aquei monographia physiologico-pathologica*, Goetting. 1816. Also in Radius, *scriptores ophthal.* v. i.

The cornea in the human eye forms a pretty regular portion of a sphere, and is of equal thickness at the circumference and in the centre; it is consequently convex on its external or anterior surface, and concave on its posterior surface. Although it appears like a homogeneous membrane, we consider it to be made up of three different structures. The anterior surface is a mucous membrane, being a continuation of the conjunctiva; the great bulk of the part is made up of the fibrous, or fibro-cartilaginous laminæ already described; the internal surface is a firm, cartilaginous, perfectly transparent membrane, adhering closely to the proper corneal substance, and called *membrane of the aqueus humor*,[*] being supposed to secrete, or to have a share in secreting that fluid. Dr. JACOB [†] observes, that this membrane preserves its transparency after maceration, or immersion in hot water, acid, or spirit, all which render the corneal laminæ opaque; and that it separates from the latter when the cornea is immersed in any fluid capable of corrugating it, after which it can easily be detached, and exhibited in a distinct state. He adds, that it passes under the sclerotic for a short distance between it and the ciliary ligament, and terminates with a defined edge. According to this representation, the cornea consists of three different structures; the anterior or mucous layer, the cartilaginous laminæ in the middle, and the membrane of the aqueus humor lining the internal or posterior surface. These, and especially the two first, are most firmly united, we might say consolidated, into one apparently uniform transparent structure.

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[*] It was first noticed by DESCEMET, and is sometimes named after him. *Observations sur la Choroïde* in the *Mem. présentés a l'Acad. des Sc.* tom. v. 1759.

[†] *Medico-Chir. trans.* vol. xii. p. 503.

Choroid coat; (chorioidea, vascular membrane, aderhaut Germ.)—This a thin, soft, and delicate membrane, remarkable for its dark colour, and great vascularity. Its numerous vessels are often found filled with blood after death, and the membrane acquires a deep red throughout, when they have been successfully injected with size and vermillion. The basis of the membrane is altogether vascular; microscopical examination, after a successful minute injection, presents to our view a congeries of minute vessels, an intricate vascular net-work, and nothing else. The dark colour of the membrane arises from the deposition into its texture of a colouring matter, called *pigmentum nigrum*, which may be considered as adventitious, and not essential to the membrane.

In order to estimate the internal structure of the choroid coat, we must examine it in its injected state. If we then survey it with the aid of magnifying powers, we find that it seems to consist entirely of arterial and venous ramifications; hence it has been sometimes called *tunica vasculosa oculi.*

The same observations may be made with respect to the iris, a part closely connected with the choroid, though differing very much in other points of structure. The basis, or essential part of its texture is completely vascular. The best views of these parts have been furnished by SOEMMERRING; he has, in several figures, exhibited the minute structure of these organs with the utmost accuracy and fidelity. You will perceive at once, upon inspecting his plates, that the objects have been correctly delineated, from the character of truth and nature which distinguishes them; and that diversity of texture in the different details, which is evidently drawn from actual observation, and could not have been supplied by the fancy of the artist. A certain portion of the internal surface of the choroid exhibits a number of radiated folds, called the ciliary processes. I mention this now, because one of SOEMMERRING's engravings represents a portion of the choroid coat, with three of the ciliary processes, and a portion of the corresponding internal surface of the iris, forming a small segment of the pupillary circle. The beautiful vascular structure of these parts is represented as it appeared under a magnifying power increasing it by twenty-four diameters. SOEMMERRING mentions that the artist spent six weeks in making the drawing, and nearly put out his eyes in the process.*

If the choroid be allowed to remain some time in water, the colouring matter is easily disengaged from the membrane; it comes off on the hand or linen, and diffuses itself through the water like Indian ink. Longer maceration discharges it entirely, leaving the texture of the choroid uninjured, but altered to a greyish colour. After immersion in spirit, the pigment will come off, particularly from the internal surface of the membrane, in masses of different size. This colouring substance is called pigmentum nigrum, a name which is appropriate enough when applied to the eye of the sheep, bullock, and many other animals, which have it of the deepest jet black; but, in the human eye, the tint of this substance is dark brown, of a deeper shade in some eyes than in others. In very fair individuals the choroid coat is of a light brown. In the human sujbect, therefore, the colouring matter cannot properly be called pigmentum nigrum, and it is more appropriately termed by foreign anatomists pigmentum fuscum. The whole internal surface of the human choroid is of the same colour as the external surface; but in the bullock, and most quadrupeds, a certain portion of the internal surface possesses colours peculiarly bright and vivid. In the cat it is a bright yellow, in the stag a very beautiful blue, in the sheep a greenish blue. This coloured portion of the choroid coat is called the tapetum or carpet; there is no part corresponding to it in the human eye. You will sometimes meet with the term *tunica Ruyschiana.* If you examine the choroid coat of an animal in the situation of the tapetum, you will find that it is partially separable into two layers. RUYSCH thought he could demonstrate a similar separation of layers in the human eye. It cannot, however, be satisfactorily exhibited in man; we therefore describe the choroid as a single membrane. The *tunica Ruyschiana* is the supposed separate internal layer.

The choroid coat, commencing at the insertion of the optic nerve, is spread uniformly over the eye-ball, concentrically with the sclerotica, and reaches to the margin of the cornea. Its external surface presents an uniform appearance in the whole of this extent, excepting a narrow portion in front, forming the ligamentum ciliare, which remains to be described. The internal surface is also uniform until it approaches within two lines and a half of the edge of the cornea: here we observe a dentated line, (*ora serrata*,) in front of which the membrane exhibits a number of longitudinal folds, arranged in a radiated manner, and reaching to the circumference of the lens; these are the ciliary processes, and the part in question, taken altogether, is the *ciliary body (corpus ciliare.)* This is best seen when the globe has been divided by a vertical section into an anterior and a posterior half, the vitreus humor and lens having been left undisturbed. Looking through the former, we see a beautiful black ring, about three lines broad, a little narrower on the nasal side, surrounding the lens. The posterior boundary of this is the *ora serrata;* the back part of the ring is a smooth black surface *(pars non fimbriata corporis ciliaris;)* the anterior portion of it, about a line in breadth, *(pars fimbriata,)* presents a series of black and white folds alternately arranged, which are the *ciliary processes*. The white lines arise by hardly visible striæ, which enlarge as they pass forwards, and form white elongated folds closely arranged, separated by black intervals, and broader, thicker, and more elevated, the nearer they approach to the lens. The black colour of the corpus ciliare is derived from a thick layer of pigment, which adheres more closely than the corresponding covering of the choroid.

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* Some further observations on the vascular texture of the choroid in man and animals, by this indefatigable and accurate observer, will be found in the *Ophthalmol. Bibliothek* of HIMLY and SCHMIDT, vol. i. p. 458.

Some have regarded the ciliary body as a peculiar structure, distinct from the choroid. They are, however, perfectly continuous; no distinction is visible externally. In essential circumstances the structure is alike, consisting of a vascular basis (of which the peculiar character in the ciliary processes is represented by SOEMMERRING with unrivalled beauty) with pigment deposited in the texture.

Iris.—The *iris*, which fills up the circular space left by the anterior termination of the choroid coat, is a part of considerable importance from its situation, and its office of regulating the quantity of light admitted into the eye, from its diseases, and its connexion with most of the important operations performed on the organ; while an equal degree of interest attaches to it physiognomically, from its brilliance, its various tints, and the animation it imparts to the countenance. Its external appearance must be familiar to every one who has looked at the human face; it is the part in which the colour of the eye, popularly speaking, resides; the brilliantly coloured portion of the organ situated behind the cornea, and close in front of the crystalline lens, in the midst of the aqueus humor, in which humor it freely moves. The opening in the centre, which is circular in the human eye, when in a healthy and natural state, is the *pupil*. In the sheep and bullock it is oblong, and its figure varies in different animals. The term iris, properly speaking, is applied to the anterior surface of the membrane, to that part which is distinguished by the brilliancy of its colour, from which attribute, together with the variety of its tints in different individuals, the name seems to have been derived. The colour of the iris varies very much in different persons, but in all it is distinguished by a greater or less degree of brilliance. This characteristic belongs only to the anterior surface, for the posterior is covered by pigmentum nigrum, indeed by a very thick and dark stratum of it, and therefore resembles the surface of the choroid, being black in animals, and dark brown in the human species. This posterior surface is called the *uvea*.

It has been disputed whether the iris is flat or convex on its anterior surface: I believe that it varies in this respect in different instances; but the convexity is inconsiderable in healthy eyes. We distinguish two surfaces, an *anterior* (iris,) and a *posterior* (uvea.) On the former, when the part is laid in water, minute flocculi are visible. It also exhibits numerous nearly parallel larger and smaller lines and fibres, proceeding like radii from the circumference towards the centre: these sometimes unite so as to form arches. An irregular line divides this surface more or less distinctly into two portions; an *external*, or larger circle, *(annulus externus*, or *ciliaris,)* and an *internal*, or smaller circle, *(annulus internus*, or *pupillaris.)*

The posterior surface of the iris presents a number of faintly marked lines, converging from its circumference towards the pupil. DR. JACOB considers that its pigment is covered and secured in its situation by a very delicate membrane: it may be easily turned down from the iris as a distinct structure. When this has been removed, and the surface washed, the iris has a grey appearance, and exhibits numerous fibres converging from the ciliary processes towards the pupil. "The latter opening," says DR. JACOB, "is immediately surrounded by a well defined distinct circle, about the twentieth part of an inch in diameter, of a denser structure than the rest of the iris; this is what has been long described as the orbicular muscle, or constrictor of the pupil."*

The iris has two margins; an *external* or *ciliary*, attached to the choroid or ciliary processes, from which it is easily separable without injury to either part, and to the sclerotica, being connected to both, not only by cellular adhesions, but by vessels and nerves; an *internal* or *pupillary*, which is the border of the central opening. The situation of this opening, however, is not exactly central; it deviates a little towards the inside, so that the iris is narrower on the nasal than on the temporal side of the pupil. This difference, which was, I believe, first noticed by SOEMMERRING, is immediately recognizable in the living eye. The ciliary margin is the only fixed part of the iris, all the rest is loose and unconnected, floating in or washed by the aqueus humor. The very edge of the pupil, which is thin and sharply defined, is coloured by the pigment; we might say, the pupillary margin is formed by the uvea, rather than the iris. The diameter of the pupil varies in an inverse ratio to the quantity of light to which the eye is exposed; in a strong light it is contracted, and the iris proportionally expanded; when the light is diminished in quantity, the opening is enlarged, and the iris, in a corresponding degree, contracted.

Not only does the colour of this part vary in different individuals, but different hues are found in one and the same iris. Sometimes different tints are intermixed throughout, as in light blue, grey, greenish, and brownish grey eyes. The inner circle is often of a different colour from the outer; for example, it may be of an orange or ochrey tint in blue or grey eyes. Sometimes there are three distinct colours in the same iris; the circumference, the middle, and the inner circle exhibiting tints quite different. Occasionally, the two irides are naturally different; and sometimes one-fourth or one-half is brown, the rest being blue or grey. In respect to these varieties, there is a marked difference between the human species and animals. It may be said of all animals, in their natural or wild state, that the colour of the iris is constant in the same species. Domesticated animals, with greater diversities in the general colour of the body, have, in some degree, a corresponding diversity in that of the iris; but in no instance are there such numerous differences as in the human subject. The colour of the iris generally corresponds to that of the external surface; it varies according to the complexion of the individual and the colour of the hair. In those of fair complexion and light hair, the iris is either blue or grey, or of some light tint; such persons are said, in common language, to have light eyes. In persons of dark complexion and hair, the iris has a deeper tint, dark grey, brown in various shades, of which the deepest is called black. In the human subject the iris is never, strictly speaking, black; the eyes, which we call black, are of a dark brown, and they always accompany dark hair and complexions more or less swarthy. The individuals of the German race are distinguished by the lightness of their hair, the fairness and ruddiness of their complexion, and by blue or light grey eyes. This combination of physical characters is remarked by Tacitus, in his treatise *De Moribus Germanorum* (rutilæ comæ, cœrulei oculi;) where *rutilæ* probably means the colour which we call flaxen; this sort of hair, and light blue eyes, are circumstances which characterise the German race at this day as strongly as at the time when Tacitus described them. All the dark-complexioned races, the Sclavonians, the Celts, the Orientals (as the Turks and the inhabitants of the western parts of Asia) and the dark-coloured races properly so called, have dark hair and the darkest irides. In the Negro this characteristic is most striking, for the iris is so extremely dark that you are obliged to look closely to distinguish between it and the pupil. In the eye, as well as in the hair and in the skin, the colouring substance seems to be something adventitious, which does not belong to the basis or natural texture of the part: for, when the colouring substance is removed, the fundamental structure remains. This is the case with respect to the individuals called Albinos, who are distinguished by a peculiar and almost morbid kind of whiteness; whose hair has a white, almost satiny appearance, and whose skin is of a dead, sickly white. In these individuals, the colouring substance of the choroid coat, and of the iris, is deficient; and the pupil, instead of being black is of a rose, or pink colour; the iris has the same pink tint in a greater or less degree, but its colour is never so deep as that of the pupil. The choroid pigment, and that of the uvea are entirely wanting; but the iris often possesses a little colour, light blue or grey; its texture is at the same time so thin, from the absence of the uvea, that the red of the choroid is partially seen through it. The colour of the iris and pupil in these cases depends on the multitude of blood-vessels entering into the texture of the former, and the choroid. If we examine the eyes of such individuals, after the vessels have been injected, the choroid coat presents the appearance of an uniform red membrane without any colouring substance. In the ferret, and in the white rabbit, there is the same deficiency of colouring substance, and the red colour of their eyes is well known.

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* *Medico-Chir. Trans.* vol. xii. p. 513, 514.

The iris is considerably thicker than the choroid, except at the pupillary ring, which is terminated by a very thin and quite sharp edge. It is soft and loose in texture, being apparently made up of blood-vessels, nerves, and a fine connecting cellular tissue. Whether it has also fibres, and whether these are muscular, are questions which have been long debated, and are not yet decided. Although, when examined by the microscope, after successful injection, it seems composed almost entirely of vessels, they do not appear to contain red blood: at least, when it is wounded, no blood flows.

Retina.—The *retina*, or last of the coats of the eye, is distinguished by its soft and almost mucilaginous organization. The optic nerve passes through a small opening in the choroid and sclerotic coats of the eye; and here a singular circumstance is observed. If we make a section of the optic nerve at the point where it passes through the coats of the eye, we find that it becomes suddenly constricted, and reduced to one-third of its previous diameter. The appearance is the same as would be produced by tying a string tightly round the nerve. Having passed through the aperture of the membranes, it forms a small flattened prominence in the interior of the globe, at its fundus, *(papilla conica,)* from which the nervous filaments spread out so as to form the greyish white pulpy membrane called the retina; which may be considered as a nerve spread out into the shape of a membrane. Two different parts may be distinguished in this soft texture, an exterior medullary pulp, and an interior vascular membrane. With a camel-hair pencil we can brush away the medullary part of the retina in the form of thin flocculi floating in water: there will remain a vascular basis, of a thin and almost cob-web-like texture, made up of vascular ramifications, divided, subdivided, and united together, so as to form a most delicate membrane. The latter and the medullary pulp are respectively analogous to the pia mater and the substance of the brain.

Dr. Jacob,[*] of Dublin, who has investigated the minute structure of the eye with great patience and success, has lately demonstrated a very thin membrane, thinner and more delicate than the arachnoid coat, on the outer surface of the retina. Thus we see that the nervous pulp is inclosed between two extremely thin membranes, of which the last described separates it from the choroid, while the former is interposed between it and the vitreus humor. Nearly, if not exactly in the axis of the eye, and therefore on the temporal side of the papilla conica, we find in the retina of the human eye, a fold, a bright yellow spot, and either a hole or a thin place in the membrane. These parts were discovered by Soemmerring,[†] whose name they bear. The fold, which is a line or a line and half long, begins close to the temporal side of the optic nerve, and runs transversely outwards. Whether it is a part of the living structure, or arises after death, has been disputed. The yellow spot *(macula lutea)* is at the same place as the fold, and of a bright colour in the recent eye. The most exact researches render it probable that the retina is not perforated, but only thinner in this situation.[‡] The structure in question is peculiar, among the mammalia, to those, in whom, as in man, the two optic axes are parallel, viz. the monkey and lemur tribes; and it was supposed to be confined to these until the recent researches of Dr. Knox[§] had demonstrated its existence in several reptiles.

In the living eye the retina is transparent, but after death it begins to become opaque. If we examine it in an animal recently dead, we find it transparent, and we can see the choroid coat through it, as if it were not covered by a membrane. Hence the colour of the pupil is determined by that of the choroid coat, and is generally black. In certain animals, where a considerable portion of the choroid is otherwise coloured, the pupil has a luminous or shining appearance, which is the reflection of light from the choroid coat. Any alteration, which takes place in the colour of the human pupil, must be caused by a corresponding change in the choroid or the retina, or in the transparent media between the retina and pupil.

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[*] *Account of a newly discovered membrane in the eye*; Philos. Trans. 1819. *Inquiries respecting the anatomy of the eye*; Medico-Chir. Trans. vol. xii.

[†] *De foramine centrali, limbo luteo cincto, retinæ humanæ*; in Comment. Soc. Gotting. t. 13.

[‡] Jacob, *loc. cit.* p. 508. Ammon, *de genesi et usu maculæ luteæ in retina oculi humani obviæ*; 1830. 4to.

[§] *Transactions of the Wernerian Society.*

Connexions of the Coats.—Having explained the texture and composition of these parts, I shall proceed to point out the mode in which they are connected with each other. In the first place, the retina covers the external surface of the vitreus humor; the parts lie merely in contact; nothing is interposed between them: there is no cellular connexion, no passage of blood-vessels. The front edge of the retina, however, or that well-defined dentated and slightly elevated margin, which seems to be its anterior boundary, and which corresponds to the posterior edge of the ciliary processes *(ora serrata)* adheres firmly to the membrane of the vitreus humor.

The choroid coat lies upon the retina, in the same way as the retina lies upon the vitreus humor; it is merely contiguous, not actually connected with, or adherent to it. Its internal surface adheres, in the anterior part of the eye, to the vitreus humor, by means of the ciliary processes. Let me observe, in the first place, that the crystalline lens occupies the middle of the anterior part of the vitreus humor, and that on the latter round the crystalline, there is a black mark, made by a number of impressions disposed in a radiated form. This mark arises from the adhesion of the ciliary processes, and the retina does not extend on the surface of the vitreus humor further than the point where the adhesion of the ciliary processes commences. If we detach the choroid coat from the front of the vitreus humor, we shall observe the adhesion of the ciliary processes giving way, and we may see the defined edge by which the retina terminates. The external surface of the choroid is connected to the internal surface of the sclerotica, by numerous short and soft cellular threads, so loosely, that we can easily cut the sclerotic round with a pair of scissars, without injuring the choroid. The two coats adhere more firmly in front, where they are closely united by a dense white medium, called the *ciliary ligament (ligamentum sclerotico-choroidale.)* The point of union is just behind the cornea and the ciliary margin of the iris; so that this ciliary ligament, uniting the anterior edges of the sclerotic and choroid, corresponds to the boundaries of the iris and cornea. When the sclerotic and choroid have been detached from the front of the eye, the ciliary ligament forms a white circle, marking the distinction between the choroid and iris, and a similar circle defines the boundary of the cornea; hence the expressions of *orbiculus*, *annulus*, or *circulus ciliaris*, as applied to the part in question.

The connexion, to which I have just adverted, is an important part of the anatomy of the eye, because it will be seen, that at one and the same point the sclerotic and cornea are united externally, and the choroid and iris internally; while, at the same part, the choroid adheres internally to the vitreus humor, by means of the ciliary processes. Further, the *zonula ciliaris*, to which these processes adhere, is closely connected to the capsule of the lens. We may, therefore, consider this as a common point of union, embracing all the essential constituents of the globe, namely, the sclerotica, the cornea, the choroid, the iris, the vitreus humor, and the crystalline lens. It is a very important part, in a pathological point of view; for example, in inflammation of the iris, or cornea, peculiar appearances arise in the sclerotic, and the affection easily extends from the iris to the ciliary ligament and processes, and thus reaches the posterior and inner parts of the globe.

The black mark left on the vitreus humor, after the ciliary processes have been detached, is sometimes called the *zona* or *corona ciliaris*, while the ciliary ligament and processes, taken collectively, are spoken of, anatomically, under the denomination of the ciliary body, *corpus ciliare.*

To the same point, where the choroid and sclerotic are united by the ligamentum ciliare, the greater circumference, or ciliary margin of the iris is affixed; thus that ligament not only connects the two former coats, but also joins the iris to them. The iris seems, to use a mechanical phrase, to be set in the ciliary body; it is firmly connected to the boundary between the sclerotic and cornea; hence these parts, more especially the former, almost always participate in its morbid phenomena.

The *vitreus humor* appears, in its natural state, like a portion of perfectly transparent jelly. In the living human eye it is a little more fluid than we find it in the dead eyes of sheep and bullocks; for when it escapes, as it sometimes does, in the operation for cataract, it runs over the patient's cheek in a quite pellucid, but continued stream, resembling in consistence the white of an egg. We can see no fibres, no vessels, nor any particular arrangement of parts in the vitreus humor; it is perfectly pellucid, like a lump of clear glass; it is said to be composed of a cellular texture, containing water in the interstices; if it be left to itself, and particularly if you prick it, the fluid drains away; it is smooth and uniform externally, where it is in contact with the retina, the cellular substance being condensed externally into a membrane called *membrana hyaloidea*, or *vitrea.* In bulk, it composes four-fifths of the entire globe, occupying the whole cavity formed by the retina; indeed, if we make a vertical section of the eye, in either direction, the coats represent a thin cup nearly filled with the tremulous vitreous jelly. PETIT found it to weigh 104 grains in an eye of which the entire weight was 142 grains. Its cellular substance can be demonstrated by inflating and drying it after the fluid has been allowed to drain out; also by freezing the eye and then dividing it, when the figure and size of the cells is shewn by the portions of ice which they contain.

If, after removing the choroid and iris from the front of the vitreus humor, we wash off the pigment, we shall find a thin transparent membrane, extending from the dentated termination of the retina (*ora serrata*) to the crystalline capsule. This is called *zonula ciliaris*, or *zonula* ZINNII; it is the *strahlen-blättchen* of the Germans. It forms a ring corresponding in breadth to the corpus ciliare, and presents radiated grooves and folds running from behind forwards, in which the ciliary processes lie. The black pigment of the latter remains behind, after the choroid has been detached, forming a regular series of black parallel striæ, arranged in a radiated form round the circumference of the lens. The vascular layer of the retina is attached to the posterior or external edge of the zonula; while its anterior, or internal margin, is firmly attached to the crystalline capsule. The ciliary processes do not reach to the latter, but leave a small interval between their termination and the capsule; this part of the zonula presents striæ, which are continued on the anterior portion of the capsule.* Between the zonula ciliaris and the tunica vitrea an irregular space is left, which can be inflated by making an opening into the former. When air is impelled, a canal with puckered sides becomes distended, on the anterior surface of the vitreus humor, round the circumference of the lens. This is the *canal godronné*, or canal of PETIT. Some have considered the zonula ciliaris to be a continuation of the vascular layer of the retina; others have represented that the vitreous tunic divides into two layers, and that the canal godronné is left between them. The retina separates easily from the zonula after a short maceration. The latter differs in structure from the tunica vitrea, being thicker, firmer and fibrous, and it may be removed, leaving that tunic entire.

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* This appearance is described and figured by AMMON, under the name of *orbiculus capsulo-ciliaris.—Zeitschrift*; v. i. No. 1.

The *crystalline lens*,* which is imbedded in the cup-like excavation of the vitreus humor, *(fossa hyaloidea,)* is a part of firmer consistence. It is retained in its situation by a compact membrane called its capsule, which is closely connected to the membrana vitrea; but is much more firm, dense, and resisting than that membrane. The crystalline lens is an optical instrument for refracting the rays of light, and bringing them to a focus; in its recent state, if you hold it up to the flame of a candle, you may see the flame inverted as you would with an artificial lens. It is not perfectly spherical, but is composed of portions of two spheres, the posterior half being more convex than the anterior. The former is completely imbedded in the front of the vitreus humor, while the latter projects on the surface of the humor, being only covered by its capsule. The external part is so soft, that it can only be compared in consistence to soft jelly; but if this be squeezed off, the centre is found to possess the firmness of wax slightly softened: it is, in fact, firm in the centre, and gradually looser in texture towards the circumference. The firmer central portion is called the *nucleus* of the lens. How is the crystalline lens, or humor as it is also called, connected with the other parts? It seems to be no otherwise attached than by the mere mechanical confinement of the capsule. This investment contains, but it cannot be shown to adhere to, the lens; we cannot trace any blood vessels, any cellular connexion, or any direct adhesion. When the capsule is divided, the lens immediately escapes; if there be any vessels, they are of such extreme tenuity that we cannot demonstrate them, nor can we show that the crystalline lens is organically connected with the parts immediately surrounding it. When an opening is made into the capsule, a minute portion of water escapes, which is called the *aqua*, or *aquula Morgagni*, from the illustrious anatomist who first detected it.

In the living animal, and within a short period after death, the lens is perfectly pellucid, like the clearest crystal, an attribute obviously necessary to the perfect execution of its office. It gradually becomes muddy, and the loss of transparency occurs more quickly when it is immersed in water; hot water, alcohol, and acids, render it immediately and densely opaque throughout. The kind of effect is seen in the boiled fish's eye. In its pellucid state, no fibres, nor other organic arrangement can be observed; but the opaque lens has a fibrous structure, and exhibits some subdivisions of its substance. The entire body seems divided into three parts by an equal number of lines meeting in the centre. It further appears made up of concentric layers, and these seem in their nature fibrous. But can we regard these appearances, thus obviously produced by powerful chemical agency on the dead lens as illustrating its living state? or draw from them any inferences respecting the supposed actions or changes of the living organ? Can we suppose the soft jelly of the lens, or its firmer nucleus, to be muscular, capable of contraction and relaxation, and thus of changing the figure of the organ? The capsule of the lens is a perfectly transparent texture, not rendered opaque by maceration, or slight heat, and only slightly affected by boiling water or strong acids. It is compact, and perhaps cartilaginous; so firm and tough that force is necessary to lacerate it. The anterior portion is thicker and tougher than the posterior, and almost retains its figure when detached. The membrana vitrea is connected to it at the circumference of the lens, but can be easily separated; and the two structures are so dissimilar, that there is no ground for representing the capsule as a continuation of that membrane.

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* See BAERENS *de Systemate Lentis Crystallinæ*, and LEIBLEIN *de Syst. lent. cryst. Mammalium atque avium* in RADIUS *Script. Ophthalm. Minores*; vol. i.

Aqueus humor.—The last of the humors is the aqueus, consisting of a few drops (three to five grains) of clear watery fluid, filling the interval between the cornea and the crystalline lens, and escaping when the cornea is punctured. The space between the cornea and the crystalline lens is unequally divided, by the iris, into two portions, called the *anterior* and *posterior chambers* of the eye, or of the aqueus humor. Of these, which communicate by the pupil, the anterior is the most considerable, and consequently contains the largest quantity of aqueus humor. Its boundaries are the concavity of the cornea and the iris. The posterior chamber is formed by the uvea, the front of the crystalline capsule, and a portion of the zonula; being bounded laterally by the ciliary processes, the points of which project into it. The uvea seems to be in contact with the crystalline capsule, at least it is separated from it by an interval which is not distinguishable by the senses; but if the eye be frozen, a small pellicle of ice will be found between the uvea and the crystalline lens. This contiguity of the parts accounts for the adhesions so often occurring between the pupil and uvea, and the capsule, under inflammation.

It is the belief of some anatomists, that the anterior and posterior surface of the iris, and the front of the crystalline capsule, as well as the concavity of the cornea, are covered by a delicate membrane of the serous class, the office of which is to secrete the aqueus humor. On the posterior surface of the cornea it may be detected, but the existence of such a membrane cannot be demonstrated on the iris or crystalline capsule.[*]

PHYSIOLOGY OF THE EYE-BALL.

The science of optics, which has for its object the investigation of light and colours, and their relation to the organ of vision, is an extensive branch of natural philosophy, and would occupy many lectures if adequately illustrated. I cannot enter at large into a subject of this kind, and shall only make a few remarks respecting the physiology of the eye, confining myself to such topics as are most interesting in reference to disease.

The nature of light has not hitherto been clearly explained; at least, among those who have devoted great attention to the subject, diversity of opinion still prevails. For our present purpose it will be sufficient to adopt the most generally received notion, that light consists of an extremely subtile matter, emanating in all directions from luminous bodies, or from such as, not being themselves luminous, are illuminated by others, and proceeding in straight lines, to which the term *rays* is technically given.

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[*] In addition to the writings quoted in the foregoing description, and the well-known standard works of Zinn and Soemmerring, the following may be referred to on the anatomy of the eye.

The article Eye in the *Cyclopædia* of Dr. Rees, written by Mr. Barnes of Exeter.

The first volume of the *Handbuch der Theoretischen und Praktischen Augenheilkunde* of Professor Rosas. *Vienna*, 1830.

Dr. W. Soemmerring *de Oculorum Hominis Animaliumque sectione horizontali Commentatio*; cum. fig. *Gottingæ*, folio, 1818.

Doellinger *Illustratio Ichnographcia Oculi Humani*. Wirceburgi, 1817.

——— *Ueber das Strahlen-blättchen*, in the *Acta Novissima Naturæ Curiosorum*; t. ix.

Weber *in Gräfe und Walther's Journal.*

——— *de Motu Iridis*; 4to. 1821.

Various Memoirs of Petit, in the Mem. de l'Acad. des Sciences, 1723—1730.

Several papers in Ammon's *Zeitschrift*, *Gräfe, und* Walther's *Journal*, and other German periodicals.

A ray of light then is to be regarded as a straight line drawn from any luminous, or illuminated body, to the eye of the observer. We make use of the expression "rays of light," and speak of the various affections which these rays of light undergo so familiarly, that we bring ourselves at last to believe that we are designating some material existence which has been clearly demonstrated. Rays of light are to be considered as emanating, in all directions, from any luminous body. Thus a candle placed in the centre of a room fills the whole of the room with light, more or less intense; if we take any portion of the rays proceeding from it they will represent a cone, the apex of which is in the flame of the candle; from this central point the rays diverge, separating from each other more and more widely as they proceed to a greater distance. These lines of light continue to diverge to whatever extent they may proceed; however, the divergence is greatest near the luminous body, becomes less and less as the distance increases, and when the source of light is very remote, we are so little sensible of it, that for all practical calculations the rays may be regarded as parallel; hence the distinction of divergent and parallel rays.

The extremely subtile nature of light, that is, of the cause of those phenomena and influences which form the subject of optics, makes it so different from the ordinary forms of grosser matter, that it is not easy to demonstrate clearly its material nature; yet some of the affections, which light exhibits, bear a strong analogy to what is observed in the other forms of matter. Its reflection is one of these. Light falling on bodies freely permeates some, and these are called transparent. Others, on the contrary, do not admit it to pass through them, but reflect it, and these are called opaque. The light is reflected, or it rebounds from the surface of these opaque substances, and though the comparison may not be scientifically accurate, the occurrence is similar to the rebounding of a ball from a wall. The light strikes against an opaque body; the rays rebound and come back again from the body on which they fell. One of the most familiar instances of the reflection of light is that of a common mirror; the metallic coating behind the glass reflects the rays of light, which come back to the eyes of an individual standing before it, and represent his image as if it were behind the glass.

Another phenomenon exhibited by light is that called refraction, which literally means *breaking*. The rays, under certain circumstances, instead of proceeding in straight lines, are turned aside, and thus, as it were, broken or interrupted. This takes place whenever they pass from one medium into another of different density. If they travel on in one and the same medium, they invariably pursue a straight course through whatever extent of space they may be transmitted to the eye of the observer. But there are media, which, though they agree in the circumstance of being transparent, differ very much in their density; for instance, air, water, and glass. When the light passes from a rarer into a denser medium, it deviates from its straight course, and is drawn towards the perpendicular, or towards a straight line drawn through the two media at right angles to their line of contact. On the other hand, if the ray passes out of a denser into a rarer medium, it is turned away from the perpendicular. A familiar instance of this phenomenon is afforded by the appearance which a straight stick exhibits, when one half of its length is immersed in water; it appears bent, or broken, at the surface of the water; for the immersed portion is seen through the medium of refracted light, the rays which, on entering the air, have been drawn away from the perpendicular, making the object appear more elevated than it really is, and causing us to see it in a wrong position, while the portion in the air is seen by direct rays, and therefore in its true position.

It may be stated, generally, that the deviation of light from its straight course is greater in proportion to the density of the medium into which it passes; water refracts more powerfully than air, glass more than water, and the diamond more than glass; but in the case of the diamond, the influence of another principle is observed, viz. the more inflammable the nature of the body, the greater its refraction. Many familiar experiments may be made to illustrate the phenomenon of refraction; one of the most common is that of putting a piece of coin, in a basin, on the ground, and retiring to such a distance that the margin of the basin may intercept the direct view of the coin; if the basin be then filled with water, the refraction which the rays of light, proceeding from the coin, undergo in passing from the water into the air, will bring the coin, which was before invisible, into view again; we see it by refracted light, and consequently not in its true situation, the effect being exactly the same as in the case of the stick. Light coming to the earth from the heavenly bodies is refracted by the terrestrial atmosphere, and increases the appprent altitudes of all these bodies. From this cause we see the sun before it has risen above, and after it has sunk below, the horizon; thus the day is lengthened and the night shortened, and the phenomenon of twilight is produced.

When the rays of light fall on a dense, transparent body, of a convex surface, the effect of the refraction which they experience will be to collect and unite them together into one point, at a certain distance behind the medium, the degree of refraction at each point of the convex surface depending on mathematical rules, calculated from the nature of the curve on which the rays fall. The most familiar instance of this optical law is afforded by a convex glass. As there is a close connexion between light and heat, when luminous rays are brought together, considerable heat is produced, sufficient, if the sun's rays be received upon a large convex glass, to burn substances placed at the point of union. Hence arose the first application of the Latin term focus (fire place) to this point; the word is now used generally, whether heat be produced or not. A concave glass has the opposite effect; instead of uniting the rays of light, it separates and disperses them; hence, optically speaking, rays of light are said to be collected or dispersed.

In the human eye we meet with a number of transparent parts, which have the effect of collecting together the rays falling on its surface, and bringing them to a focus, or point of union, on the retina. The eye may, in this point of view, be regarded as an optical instrument; and as the effect of different transparent media on the rays of light may be calculated mathematically, the density and configuration of the media being previously given, we may, in some degree, imitate the composition of the eye artificially, and by putting together substances of a certain density and configuration, produce an instrument which will refract, collect, and unite the rays of light into a focus, in a manner nearly similar to that of the living eye. When it is said that the eye can be imitated artificially, it is to be understood, of course, that this can only be effected imperfectly. It is true that the human eye is an optical instrument, but it is so perfectly constructed, that the most profound theory can scarcely appreciate all the wonders which it exhibits, and the most exquisite art can only arrive at an imperfect imitation of it.

The business of vision is two-fold; consisting, first of the mechanical, or optical effect, produced by the transparent media on which the rays of light fall; and secondly, of the impressions on the nerve, and through it on the sensorium, by which the mental perception of external objects is produced. If the transparent media possess a given density and a given configuration, and are situated in certain relations to each other and to the retina, the result will be, that the rays of light falling upon the eye, from any object at a certain distance, will be collected together into a focus on the retina, and upon that part of the retina will be represented a miniature picture of the objects placed before the eye; but, in this representation, the objects are inverted, or upside down.

We can prove, by calculation, that the effects of the transparent media of the eye on the rays of light would be such as they are in fact found to be; the results of experiment coincide perfectly with those of calculation, and the proof is easily exhibited, since the phenomena, being purely mechanical, take place in the dead just as perfectly as in the living eye. If we take the eye of an animal recently dead, and dissect away the back parts of the sclerotic and choroid coats, so as to expose, without wounding, the retina, and then hold it up at a certain distance from the candle, we shall see a miniature representation of the candle on the retina, with the apex of the flame downwards. The flame of the candle is seen inverted through the crystalline lens. If an eye prepared in the same way be placed in a hole made in a window shutter, an inverted miniature picture of the external objects is seen on the retina.

These are the general effects of the action of the eye, considered as an optical instrument. The rays of light fall in the first instance upon the cornea, which, being a convex body, of greater density than air, exerts a refractive force upon them, drawing them together, so that if they were continued in the same direction and medium, they would meet in a focus at a certain distance behind the retina. All the rays falling upon the cornea do not pass through it; in order to permeate it, they must strike upon the parts within a certain given angle (of about forty-eight degrees.) Those which fall upon it more obliquely, are reflected from it, and produce that sparkling appearance which characterises the living eye, and which it is necessary to introduce into portraits, in order to give them a character of life. The same reflection produces the image which we see behind the cornea, as that of our own countenance, when we are examining the eye, or that of an opposite window. The light, having been refracted by the cornea, passes through the pupillary opening, which, however, transmits that only which is near the centre; the lateral rays striking upon the iris, are reflected from it, and hence the peculiar brilliancy of that part. This is so striking in some individuals, that their eyes are literally, not metaphorically, sparkling. The degree of brilliancy depends upon the nature of the surface on which the rays strike; and this is different in different individuals. When the iris is altered by disease, nothing is more striking than its change in this respect; it no longer reflects light as in its healthy state, and the eye thus acquires a peculiarly dull and dead expression.

The pupil is the opening through which light enters the dark chamber of the eye; it is analogous to the aperture by which light is admitted into the optical instrument called a *camera obscura:* the interior of the eye is a dark chamber of the same kind.

The rays of light, after passing through the pupil, strike upon the crystalline lens, where they undergo a powerful refraction; that lens being the principal agent of this process. The light thus refracted is ultimately brought to a focus on the concave surface of the retina. It must be understood that I am speaking of light proceeding from objects placed at a certain distance from the eye, and falling upon it in such a way as to produce distinct vision. The eye is subject, in this respect, to the same laws which are applicable to all optical instruments. It can only distinguish objects with accuracy at a certain distance; and though it may perceive more remote objects sufficiently for many purposes, vision beyond a certain limit ceases to be distinct.

I have stated that the crystalline lens is the principal agent of refraction; consequently when it is lost, as after the operations for cataract, the refractive powers of the eye are greatly weakened, and it is necessary to substitute for the lens, which has been removed from the axis of vision by the operation, a glass of considerable convexity, even for the ordinary purposes of vision. It is difficult to appreciate exactly the effect which the crystalline lens produces on the rays of light, in consequence of its peculiar structure, varying in density from the centre to the circumference. Opticians represent that this peculiarity renders the eye achromatic. Achromatic means colourless; and it is a great object to construct optical instruments, such as telescopes, microscopes, &c. in such a way, that after the various reflections and refractions which the light may undergo, the object may be represented clear, well-defined, and uninterrupted by any admixture of prismatic colours. The decomposition of light which leads to this inconvenience, takes place at the surfaces of the glasses, through which it passes. If the lens had been of uniform density throughout, and as firm as its central portion, there must have been a reflection at both its surfaces, rendering the retinal picture indistinct; but, by the softness of its exterior, the density of its surfaces approximates to that of the aqueus and vitreus humors, and it refracts without reflecting or decomposing any of the light which falls on it.

The rays of light, in passing through the crystalline lens, undergo decussation; hence the picture represented on the retina is inverted. This is a mere optical phenomenon, not depending on any vital action, but arising from the mode in which the rays cross each other in their passage through the lens.

The vitreus humor gives passage to the converging rays, without altering them. This structure distends the globe to the requisite magnitude, affords a soft medium on which the retina may be expanded, and keeps that nervous expansion at the proper distance from the lens and other parts of the organ. It has nothing else to do with vision.

The iris can enlarge or contract its pupillary opening, and thus regulate the quantity of light admitted into the dark interior of the eye. When the organ is exposed to a weak light, the pupil is enlarged; when to a strong one, it is diminished; so that, in the living eye, if the quantity of light be altered, you will observe corresponding changes in the dimensions of this opening. These alterations are effected by contraction and dilatation of the iris, the motions of which are performed from the ciliary margin, or greater circumference, as a fixed point. Here the iris is closely attached to the ciliary body, the rest of the membrane being loose and moveable. The iris contracts, or is rendered narrower, to dilate the pupil, the pupillary margin being drawn towards the ciliary edge; while the contraction of the aperture is effected by the pupillary margin being carried to a greater distance from the ciliary. These phenomena may be observed by placing a person opposite to a window, and putting your hand between his eye and the light; the iris will contract and dilate according as the light has free access, or is intercepted. If a strong light be suddenly thrown on the eye, the pupil will be considerably contracted; a painful sensation is at first experienced, and the person feels dazzled; but the pupil immediately contracting, shuts out the offensive quantity of light, and thus moderates the effect of its sudden influence upon the organ. When the eye, after having been exposed to a strong light, is suddenly submitted to a much weaker, the opposite changes ensue; the pupil dilates, and the effect upon the individual, when he is first introduced into the less degree of light, is almost to blind him for the moment; the pupil, however, gradually dilates, so as to admit the quantity of light necessary to vision in the new situation.

A question here arises, how these changes take place. They are not produced by the immediate influence of light upon the iris; for if we direct a strong light upon that part, taking care that it shall not enter the pupil, no contraction of the aperture takes place. The iris does not move, the pupil is not altered, unless the retina be influenced.

If, then, the motions of the iris depend on the retina, when the latter becomes insensible to light, the pupil ought no longer to exhibit any change from variation in the quantity of light, and any degree of insensibility in the retina ought to be accompanied with a corresponding deficiency of motion in the iris. In general this is the case; but the phenomena of disease present some circumstances which are not reconcileable with this view of the question. In the first place, we must distinguish between the independent motion of the iris, and its associated or sympathetic action. The latter often continues, when the former is at an end. Sometimes the optic nerve is completely insensible in one eye, and light produces no effect whatever upon the iris of the diseased eye, if the sound eye be kept carefully closed; but if we produce motion in the iris of the sound eye, by varying the quantity of light, corresponding motion will be observed in the diseased eye.

Another circumstance is quite irreconcileable with the opinion which regards the action of light upon the retina as necessary to the motions of the iris. In some instances, not merely of partial, but complete amaurosis, the iris not only retains a degree of motion, but occasionally its movements are perfect. In amaurosis caused by hydrocephalus, when the retina is completely insensible, so that the patient cannot distinguish light from dark, I have not unfrequently seen a perfect state of the motions of the iris. The phenomenon in question is not confined to instances of that description.

These facts throw considerable doubt upon the received notions respecting the physiology of the motions of the iris, and on the usual explanation of that familiar phenomenon, the changes in the dimensions of the pupil.

I will just advert to two other points, which may tend to illustrate the subject we are now considering. If we were asked, what is the condition of the pupil during sleep? we should probably say that it must be dilated, because light is excluded, and the organ is in a quiescent state. However, it is contracted, of which we may easily convince ourselves, by examining the pupil of a sleeping infant. By gently elevating the upper eye-lid, we can examine the eye, and ascertain the state of the pupil, without waking the child. We should not have expected what we find, namely, that in this quiescent state of the organ, accompanying the repose of the external senses, and of the sensorium, and the general relaxation of the voluntary muscles, the pupil is contracted. The other circumstance is the state of the pupil, when the nerves which supply it are paralysed. It is now largely dilated, contrary, probably, to what we should infer from its contracted state during sleep. I have lately seen two cases in which there was a paralysis of all the parts supplied by the nerves of the third pair, viz. three of the recti muscles, one of the obliqui, and the levator palpebræ superioris, so that the upper eye-lid could not be elevated, and the globe was drawn outwards by the external straight muscle. In both instances the pupil was largely dilated. It may, perhaps, be suspected, that the optic nerve was insensible; but this was not the case, for in one of these instances, when the patient looked through a minute opening in a card, producing what may be called an artificial contracted pupil, vision was perfect. I mention these facts, because they may assist in the investigation of the subject, for further inquiry is undoubtedly necessary. If a perfect state of motion can subsist in the iris when the retina is completely insensible, the changes of the pupil cannot be referred to the effect of light upon the optic nerve. To what, then, it may be asked, are we to refer them? How are they to be explained? I confess that I cannot explain them.

Another inquiry has been made respecting the structure and motions of the iris; whether they are muscular or not. This question is, in a great measure, a verbal one, and the answer will depend on the notions we affix to the expressions *muscularity* and *muscular motion*. In external appearance, and on the first view, the iris is unlike any other muscle, whether of the voluntary or involuntary kind, though it presents an obvious fibrous arrangement, both in its anterior and posterior surfaces. On the former or coloured surface, there are evident fibres or striæ, of a radiated disposition, converging towards the pupil. We observe in this anterior surface an evident division into two parts; an outer or larger, an inner or smaller circle; these are generally different in colour, the inner being usually the darkest, and not unfrequently of a different tint. The external circle exhibits an arrangement of radiated fibres, which, arriving at the inner circle, divide into branches uniting together laterally, so as to form an undulated line of division between the two circles: from this line numerous straight and delicate parallel fibres proceed to the pupillary margin. When the dark pigment has been washed off the uvea, it has a whitish or greyish colour, and the surface is composed of straight fibres, converging from the ciliary to the pupillary margin, puite unlike those in the anterior surface. The iris resembles muscular organs in its great vascularity, and copious supply of nerves. The latter, from twelve to twenty in number, of the size of sewing-threads, come from the lenticular ganglion, and run between the sclerotic and choroid coats, where we meet with them, on cutting round the former, distinguished by the contrast of their whiteness with the dark ground of the choroid. The muscularity of the iris has certainly not yet been established by direct anatomical investigation, although much pains have been bestowed on the inquiry, and the aid of magnifying powers has been employed. Indeed, from the delicacy and minuteness of the parts, the subject is a difficult one; and, as the question turns on minute circumstances of colour, arrangement, and size, the observer easily succeeds in seeing that which his previous opinions lead him to wish. Thus, while many can find in the iris nothing but an intertexture of blood-vessels, others feel quite certain that the anterior fibrous arrangement is a radiated muscle, the contractions of which contract the iris and enlarge the pupil; and they are equally positive that the posterior surface of the organ has a circular or sphincter muscle, which antagonises the former. The iris does not contract, like other muscles, from the application of galvanism, or of mechanical or chemical stimuli after apparent death. If light be its appropriate living stimulus, it causes elongation of the fibres, not contraction, as in the case of other muscles.

The size of the pupil varies in some degree according to the distance of the object. It dilates when the eye is directed to a remote object, in order to admit a greater quantity of light, which reaches the organ in a less intense state, and it contracts when directed to a near object, as the light then comes in a more powerful form. These alterations, however, according to distance, are irregular and limited, and by no means adequate to account for the adjustment of the eye to different distances. The quantity of light influences these changes, as well as the distance; for if the body, although extremely remote, be powerfully luminous, the pupil contracts, as in looking at the sun. Distinct vision requires not only perfectly pellucid humors, and a clear picture of the object on the retina, but also that the interior of the eye should form a perfectly dark chamber, to absorb all the light except that which contributes to form the image on the retina. Hence the dark colour of the choroid, ciliary processes, and uvea: hence, in man, where the whole of these are coloured by the dark pigment, vision requires much light, and he sees badly in the dark. Animals, on the contrary, have part of the internal surface of the choroid (the tapetum) light, and capable of reflecting the luminous rays. Those rays, which the dark human choroid absorbs, are reflected by the tapetum of the animal, and again strike the retina, thus producing a greater impression with less light, a circumstance of great importance to those which feed and pursue their prey by night. The herbivorous tribes, in many cases, go on feeding in the dark; the carnivora are drowsy and inactive by day, and go out to supply themselves with food at night. The reflection of light, from the tapetum, gives a luminous appearance to the eyes of animals in the dark; the pupil is dilated, and the reflected light is of the same colour as the tapetum. This is a fact of familiar observation in the cat, where the bright yellow of the tapetum renders the phenomenon very conspicuous. In our own species, individuals with light choroids see in weak light better than those in whom the membrane is dark. The light of day is too powerful for the Albino; it dazzles him, and obscures his vision. If he attempts to examine any object in the full glare, he knits and draws down his brows, and keeps his lids almost shut. In twilight, however, he sees clearly, and he has tolerable vision even in the dark. The ferret, which has no pigment, is a kind of subterraneous animal, following its prey under ground; and the rabbit, in which the same deficiency so often occurs, requires, from its habits of life, a similar kind of vision.

The situation of the impression on the retina is at the intersection of the optic axis with that nervous expansion.

The optic, or visual axis, is a straight line drawn through the centre of the cornea, pupil, lens, and vitreus humor, and consequently meeting the retina at the centre of the posterior hemisphere of the globe; the light refracted by the cornea and lens will come to a focus at this point. In order to see an object perfectly, it must be so placed that the rays proceeding from it may be collected in this situation. Under other circumstances an imperfect image is formed on the retina, and the further the objects are placed from the direction of the visual axis the greater is this imperfection, until at last vision is not effected. The limits of its exercise around the visual axis correspond with the external boundaries formed by the surrounding parts of the face; the greatest scope is outwards, the next downwards, then inwards, and the most confined range is upwards; thus we have the widest extent of vision in those directions in which the greatest number of objects occur. The retina is much more extensive than the field of vision; indeed a considerable portion of it is so placed, that the light going through the transparent media of the eye can never be brought to a focus on it.

The visual axis strikes the retina externally to the termination of the optic nerve, which is placed considerably nearer to the nasal than to the temporal side of the globe. The entrance of the nerve through the choroid, which appears as a small, round, white spot on the interior of the globe, is called porus opticus, and is said to be insensible; if it be so, we understand why the nerve did not penetrate the tunics in the centre. We certainly should not have supposed, *a priori*, that this part could be destitute of sensibility; for the nervous matter, which is thinly and widely expanded in the retina, is here concentrated into a small spot. Experiments, however, are cited in proof of the fact, and they show, at all events, that there is an insensible spot not far removed from the axis of vision. Some complicated means of bringing the light to bear on the porus opticus of each eye at the same time are detailed in works on natural philosophy. You may, however, convince yourselves of the fact by a more simple trial. Stretch out your arms at full length, with the thumbs extended and close together; shut one eye (say the left) and keep the other stedfastly fixed on the left thumb; keeping the left hand steady, and the right eye fixed on it, move away the right hand slowly towards the side; the right thumb will be lost for a moment, at a certain distance, and then come into view again.

Calculations have been made of the size of the retinal picture; that it must be extremely small is obvious. A landscape, of miles in length and breadth, with its hills, woods, rivers, houses, cattle, and all the endless details belonging to these and a thousand other objects, is painted in a membranous space not larger than the finger nail, by means of light let in at an aperture (the pupil) often not larger than a pin's head. No part of the animal economy is more calculated to excite our surprise and admiration than the contemplation of results so multiplied, varied, and important, produced by means so simple and apparently trivial. In the section of a gilt silver wire we can distinguish the gold, when its thickness does not exceed the 110,000,000th part of an inch. How shall we calculate the size of the image on the retina?

Physiologists have been much puzzled by the inverted image on the retina, and have endeavoured to explain how, in spite of this, we see things in their true position. It must be observed, that every thing we see is painted inverted on the retina, and the problem is, to find out how we avoid the error that would apparently be produced from this cause, and see all external objects in their true relation to ourselves. BUFFON, CONDILLAC, and others, boldly assert that we actually see them inverted; that they appear at first upside down; that touch corrects the mistake, and that by habit, at last, we see them in their true position. Not a single fact can be adduced in proof of this position; on the contrary, all our observations on infants, on persons born blind and restored to sight, on the newly-hatched bird, and the newly-born calf, foal, lamb, and other animals, clearly prove that, in respect of relative position to themselves, their vision leads them into no error. If we see every thing inverted, and have to depend merely on experience and habit for rectifying so essential an error, the correction could apply only to objects seen repeatedly; but we see new objects just as correctly, in relation to ourselves, as those with which we are most familiar. We judge of situation by the direction in which the luminous rays reach the eye; in obedience to this law, we shall refer the upper and lower end of an object to their real places, although the rays strike on the respectively opposite parts of the retina. On the same principle we often err in the situation, and no length of experience rectifies the error. We see our own image behind the mirror; we see it lengthened, shortened, inverted, according to the form of the mirror; and we see the stick, which we well know to be straight, crooked when it is half immersed in water. The notion of naturally seeing things inverted arises from a partial view of the subject; as if vision were performed in the orbit; as if the sensorium were just behind the retina. The image on the retina is only one of many conditions belonging to vision. Consider the long course of the nerve in the orbit; its long passage within the skull, and the junction with that of the other side; its complicated connexion with various cerebral parts. The original picture may be modified in many ways that we know nothing of, before the ultimate impression on the sensorium. That a picture on the retina should let into our minds all the boundless extent and diversity of visual perceptions, is indeed unintelligible to us as to the mode of accomplishment; but the communication of a knowledge of true position by an inverted retinal image, is neither more nor less difficult to comprehend than the mental perception produced by impression on the nerves of any other sense.

Philosophers have given a similar solution of single vision with the two pictures, one in each eye. The difficulty here has arisen from our tracing the exact impression on the nerve, and finding it to be a picture. Is there not just an equal difficulty in single hearing with two ears? single thinking with a double brain? and the tangible perception of a single object with impressions on thousands of cutaneous nerves? Here again philosophers have confidently asserted that we naturally see double; that touch gradually teaches us that objects are single, and habit at last makes us see them so. We have not a shadow of proof to support so strange an assertion, while we collect clear evidence from infants, cataract cases, and young animals, that they naturally see objects from the first single. Experience is of no use when an error is really made; in sensorial affections, accompanied with strabismus, in displacement of one globe, or by pushing one eye aside with the finger, double vision is produced, and continues as long as the cause lasts, in spite of our perfect knowledge that the objects thus seen double are really single. Further, we find that in the attentive exercise of vision, when we look at objects, one eye only is employed, although both may be open, and apparently directed towards the object thus examined. A familiar experiment proves this: placing any object (a pencil) between himself and a candle, let a person bring the pencil and flame into a line, with both eyes open; then let him close one eye, if it is the weak eye, the flame and pencil are still seen in a line as before; if it is the strong eye, the flame of the candle seems to move aside, and is now seen out of the line with the pencil. In a considerable majority of instances, the right is the strong eye, or the one used for attentive vision.

ANATOMY OF THE APPENDAGES OF THE EYE.

THE appendages of the eye consist of the parts which move it, the muscles of the globe; of those which cover externally and protect it, the eye-brows, the eye-lids, and their muscles; of the mucous membrane which connects the globe to the eye-lids, the conjunctiva; of the organs, which secrete, distribute, and convey away from the surface of the eye such fluids as lubricate it, the lacrymal organs, or apparatus. They are sometimes divided into the orbital and facial appendages, the eye-lids and eye-brows forming part of what is called the face, and the muscles and other parts being contained in the cavity of the orbit.

Muscles.—The globe of the eye is moved by six muscles, four of which, namely, the recti or straight muscles, are nearly alike, and very simple in their origin and arrangement. They arise from the margin of the foramen opticum at the bottom of the orbit, pursue a straight course, and are inserted by broad tendons into the sclerotic coat; they closely embrace the optic nerve at their origin, surround it more loosely in their progress, and include the globe between their tendinous expansions, being situated respectively above, below, on the outside and inside of the nerve and globe. These four muscles move the globe in the four directions of their course, or in the intermediate direction, when the actions of two are combined.

There are two oblique muscles, the superior and inferior. These are situated obliquely with respect to the globe, and give it a rotatory motion downwards and outwards, (obliquus superior,) or upwards and inwards, (obliquus inferior,) acting together, they turn the eye-ball towards the nose.

The use of the recti muscles is obvious: they are voluntary agents connected with the office of the retina. They can move the globe, in obedience to the will, so as to direct the visual axis successively to the various parts of any object which we are desirous of surveying. They can carry the globe into every situation, in which the surrounding bony prominences admit of vision being exercised. When a greater extent of motion is required, we direct the optical axis to the object, by turning the whole head.

The effect of the obliqui is by no means so apparent. They have been called *circumagentes* or *amatorii*, having been probably regarded as muscles of expression, and supposed to be subservient to the motions which take place in ogling. We find them, however, in the eyes of animals, which certainly do not make love in that way.

The physiology of these muscles has been greatly elucidated by Sir Charles Bell,* who has noticed and explained certain movements of the eye, which had hitherto nearly escaped attention. These are involuntary motions, by which the globe is rolled upwards, for the purpose of clearing the cornea, or protecting and defending the eye, in ordinary winking, in the closure of the lids when any thing approaches capable of injuring the eye, and in sleep. "There is a motion of the eye-ball," says Sir Charles, "which from its rapidity has escaped observation. At the instant in which the eye-lids are closed, the eye-ball makes a movement which raises the cornea under the upper eye-lid. If we fix one eye upon an object, and close the other with the finger in such a manner as to feel the convexity of the cornea through the eye-lid, when we shut the eye that is open, we shall feel that the cornea of the other eye is instantly elevated, and that it thus rises and falls in sympathy with the eye that is closed and opened. This change of the position of the eyeball takes place during the most rapid winking motions of the eyelids." Sir Charles observes that this movement takes place when the eye-lids cannot be closed in consequence of contraction from burns or paralysis of the orbicularis. In the latter cases I have repeatedly observed the fact, and pointed it out to others, although I had not reflected, as Sir Charles has done, on the nature and mechanism of the phenomenon. The use of this movement in sweeping and clearing the surface of the cornea is obvious. "By the double motion, the descent of the eye-lid and the ascent of the cornea at the same time, the rapidity with which the eye escapes from injury is increased." The globe is rolled upwards in the same way during sleep, and on the approach of death. The fact had been observed in the former case, and even delineated by

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* *On the motions of the eye*; Philos. Trans. 1823; and in *the nervous system of the human body*, p. 177.

SOEMMERRING in his first plate; but he erroneously ascribes the movement to the rectus superior, which, being a voluntary muscle, cannot be in action during sleep. Moreover, when the rectus superior turns the globe upwards, as in contemplating an object placed higher than the head, its action is united with that of the levator palpebræ; while, in the case under consideration, the rolling upwards of the globe is associated with descent of the upper lid. SIR CHARLES observes further, that this involuntary action of the obliqui is seen in oppression of the brain, in faintness, in debility after fever, in hydrocephalus, and on the approach of death, when the action of the voluntary powers is either greatly enfeebled, or altogether suspended.

Nerves.—The orbit contains several nerves, of which the optic, or nerve of the second pair, is the most considerable. Its magnitude sufficiently points out the importance of the sense to which it is subservient. In size it is the second of those connected with the basis of the brain, being inferior only to the nerve of the fifth pair. The optic nerves have this singularity, that they converge towards each other within the cavity of the skull, all the others diverging to their respective destinations; they meet together, and their respective substances are united into one mass on the anterior surface of the sphenoid bone. This kind of arrangement is found in no other instance. The intermixture of their substances may account for the intimate sympathy between the two eyes, and for various morbid phenomena. The nerves, having united, separate again, passing each through its respective foramen opticum into the orbit, and terminating in the posterior part of the eye-ball. In the progress from the foramen opticum to the globe, another peculiarity is observed; the nerve is closely invested by a sheath of dura mater, a prolongation of that fibrous membrane which lines the skull.

The function of the optic nerve is entirely confined to the sense of vision. It is even destitute in its healthy state of ordinary sensibility. MONS. MAGENDIE[*] pushed the opaque lens against it in the operation of depression, and not only touched, but punctured it with the cataract needle repeatedly, without causing pain or any sensation to the patient. These injuries were not followed by any inflammation or impaired vision.

The cavity of the orbit contains further the nerve of the third pair, which is employed in supplying three of the recti muscles, one of the obliqui, and the levator palpebræ superioris, besides forming the principal origin of the lenticular ganglion, from which the nerves of the iris proceed; the nerve of the fourth pair supplying the trochlearis muscle; the ophthalmic branch of the fifth, which contributes a small branch to the lenticular ganglion, sends off a few small twigs in the orbit, and then leaves the cavity at the supra orbital foramen; and the nerve of the sixth pair, for the external straight muscle. We cannot hesitate in concluding with SIR CHARLES BELL,[*] that the ophthalmic branch of the fifth gives common sensibility to the surface of the eye and the lids, and that the destructive inflammation of the organ, which ensues, when the fifth nerve is destroyed by injury or disease,[†] arises from the loss of this sensibility. The third and sixth nerves are obviously voluntary; SIR CHARLES regards the fourth as an involuntary nerve, without considering the point clearly proved.

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[*] *Sur l'insensibilité de la rétine de l'homme; Journal de Physiologie*, t. v. p. 37.

The cavity of the orbit contains also the ophthalmic artery, the various ramifications of which supply the globe of the eye, and the parts belonging to it; and the ophthalmic vein, by which the blood is returned from the orbital arteries into the cavernous sinus of the dura mater, through the foramen lacerum orbitale. The orbit also contains the lacrymal gland, which has its nervous supply from the ophthalmic branch of the fifth.

The several parts just enumerated are connected together by a copious and particularly soft adipous substance, which in the living subject is almost fluid, and therefore readily accommodates itself to the different motions of the eye, and to the various changes of position which may occur in the globe. The bony cavity is lined by a fibrous membrane, which is a direct continuation of the dura mater, and technically called *periorbita*, bearing the same relation to the bone to which it is attached, as the pericranium does to the skull, or the periosteum to other bones. The peculiarity of the arrangement consists in its being continuous with the dura mater at the foramen opticum, like the fibrous sheath that covers the optic nerve.

The *eyebrow* is the arched prominence which terminates the forehead and overhangs the eye; it consists partly of bone and partly of muscular and other soft parts. The bone is the superciliary ridge of the os frontis, forming the superior arch of the anterior orbital aperture. Immediately on the surface of the bone lies the corrugator supercilii muscle, which is subservient to the motion of the brow. It derives its origin from the nasal process of the os frontis, turns upwards and outwards in the direction of the eye-brow, and is lost among the fibres of the orbicularis palpebrarum and the occipito frontalis; it consists of a considerable fasciculus of muscular fibres. Its action throws the eyebrow and forehead into those longitudinal folds which are exhibited in frowning; it is, in fact, the muscle of frowning; it is more important as an instrument of expression than in reference to the physiology of vision; its indications are rather of a pathognomic than of a physiological kind, and illustrate the state of feeling or passion in the individual. Hence it is peculiar to the human species, though I am not prepared to say that it may not be found in those of the simiæ, or monkey tribe, which approach the nearest to man

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[*] *On the nerves of the orbit; Philos. Trans.* 1823, and in *the nervous system, &c.* p. 203; *also* APPENDIX, No. viii. p. 23 and 103.

[†] MAGENDIE *de l'influence de la cinquième pair des nerfs sur la nutrition et les fonctions de l'œil*, in the *Journal de Physiologie*, t. iv. p. 176, and *suite des experiences, &c. ibid.* p. 302.

Over the corrugator supercilii there is a stratum of fibres forming a portion of the orbicularis palpebrarum; there is, further, a portion of adipous substance, covered by integument similar to that of the face in general, with the exception of the skin having a number of hairs implanted in it. These hairs are peculiar in their form and arrangement; they do not run lengthwise with respect to the brow, but are short, and form a double series, of which the inferior are directed upwards and outwards, the superior downwards and outwards, and the two orders meet and form a kind of ridge in the middle of the brow.

The *palpebræ*, or *eye-lids*, are a thin and moveable kind of curtain, closing the anterior aperture of the orbit. Anatomically speaking, the boundaries of the eye-lids are, the eye-brow above, the cheek below, the temple on the outside, and the nose on the inside. The palpebræ are the parts included between these boundaries; when they are approximated to each other, they completely shut up the bony opening of the orbit, which is exhibited in the skeleton. As the eye-lids are adapted to the front of the globe, they are concave on the posterior surface, and proportionally convex on the anterior. They are made up of skin, muscular fibres, cartilage, and mucous membrane. They are separated from each other by a horizontal slit or opening, which is closed when they are completely approximated, and enlarged in various degrees as they are moved apart from each other. The separation of the lids from each other is termed in popular language opening the eyes. The palpebral aperture or slit is said generally to be placed horizontally or transversely; but it is not strictly so, for the outer or temporal part is a little lower than the inner or nasal portion. The palpebræ are more firmly fixed to the bone at the nose than towards the temple.

Their motions are performed by two muscles; one situated in the cavity of the orbit, and the other on the face. The former is the levator palpebræ superioris, arising close to the superior rectus, from the margin of the foramen opticum, running along the upper part of the orbit, and inserted by a broad expanded tendon into the whole breadth of the upper lid. The other muscle is the orbicularis palpebrarum; it consists of a broad stratum of fibres, deriving its origin from a small tendon at the side of the nose. This tendon is placed in the front of the excavation which lodges the lacrymal sac. The fibres, which are immediately under the skin, and arranged in a circular form round the eye-lids, cover the whole surface of these, reaching to the ciliary margin, and extending over the adjoining part of the eye-brow, temple and cheek.

When the eye is shut, the levator muscle elevates the upper lid, and draws it away from the lower. In opening the eye, the two lids are not equally moved, the inferior remains nearly at rest; it descends a little, but the separation is chiefly accomplished by motion of the superior lid. The two palpebræ contribute unequally to cover the globe of the eye, the superior being by much the largest or deepest; the line of junction between the two lids does not run along the middle of the anterior surface of the eye, but is situated below the inferior margin of the cornea; and the superior lid, in its closed state, covers the whole of the cornea. SOEMMERRING, in the first plate of his work, gives a front and side view of the lids as closed in sleep, and represents the line of junction between them as more than one-eighth of an inch below the inferior margin of the cornea. The levator then, by elevating the upper lid, denudes the anterior surface of the globe, but its continued action is necessary in order to keep the eye open; the weight of the upper lid would carry it down, unless there were some cause to counteract this tendency. Accordingly, when the action of this muscle is suspended, the lid drops of itself in front of the eye. When persons are extremely tired, and incapable of continuing voluntary exertion, the lids descend, or, in popular language, the eyes feel heavy. A fortiori this effect will be produced, when the muscle is paralysed; the power of opening the eye is either partially or entirely lost, according as the paralysis of the levator is partial or complete. Such affections are by no means uncommon; indeed I know no single muscle of the body which is so frequently the subject of paralytic affection independently of all others. May not this arise from the constant duty required from it, and consequent exhaustion of its power? The explanation of the phenomenon must be sought for in some cause affecting the muscle, and not the nervous trunk, since the other muscles supplied by the same nerve are very seldom affected.

Sir Charles Bell has shown that the levator palpebræ not only elevates the upper lid, but that, at the same time, it depresses the lower. "Anatomists," he says, "have sought for a depressor of the inferior eye-lid, seeing that it is depressed, but such a muscle has no existence, and is quite unnecessary. The levator palpebræ superioris opens wide the eye-lids, depressing the lower eye-lid at the same time that it elevates the upper one. If we put the finger upon the lower eye-lid so as to feel the eye-ball when the eye is shut, and then open the eye, we shall feel that during this action the eye-ball is pushed outwards. Now the lower eye-lid is so adapted as to slip off the convex surface of the ball in this action, and to be depressed, whilst the upper eye-lid is elevated."*

The orbicularis palpebrarum is the antagonist of the levator; the contraction of its circular fibres, according to its degree, will either diminish the dimensions of the palpebral aperture, or completely approximate the lids. Sir Charles Bell has observed that the two lids do not move in the same direction when the eye is shut. The upper descends and rises perpendicularly, while the lower plays horizontally like a shuttle, being moved towards the nose, when the eye is closed. He considers this a part of the curious provision for collecting offensive particles towards the inner corner of the eye.† When the levator is relaxed, the gradual descent of the upper lid, by its own weight, will slowly close the eye; and this may be exemplified by elevating the lid when the muscle is paralysed. Generally, however, this passive kind of closure does not answer the purpose; we want to shut the lids more quickly, and we employ the active exertion of the orbicularis; its sudden and forcible contraction draws the lids together when a foreign body approaches, or when the organ requires shelter from too strong a light. In these cases the muscle can contract with great force, as we find when we attempt to draw the lids apart, in opposition to the will of the individual. Even in a child, labouring under intolerance of light, we can hardly overcome the violent and spasmodic contraction of the orbicularis. The action of this muscle not only closes the eye, but corrugates the whole integuments of the lids, temples, and surrounding parts. The orbicularis in front, and the orbital muscles behind are antagonist powers, between which the globe is retained in a proper position. Where the former is paralysed, not only are the eye-lids and the surrounding integuments flabby and folded, but the globe protrudes unnaturally, as if it were pushed forwards by a force acting from behind.

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* *The nervous system of the human body*, p. 186.

† *Ibid*, p. 182.

The lids are formed of several different textures, which I shall enumerate in their order. The external surface is skin, peculiarly thin and delicate, so that, in fair persons, we not only see through it the ramifications of the subcutaneous vessels, but can even trace their minute divisions. In young persons, this portion of integument is perfectly smooth, but, as age advances, it loses its elasticity, and falls into wrinkles. When the upper lid is elevated, a deep fold is observable between the lid and the eye-brow; there is no corresponding fold in the lower lid. Immediately under the skin is the stratum of fibres composing the orbicularis palpebrarum. Next, in the upper lid, is the expanded tendon of the levator palpebræ superioris; there is no corresponding part in the lower lid. We then come to the part which gives firmness to the lid, extending and supporting the softer textures; it is a thin and flexible, yet firm and elastic cartilage, or rather fibro-cartilage, on which the skin, muscular fibres, and mucous membrane, may be said to be stretched. It can bend, and change its figure, recovering itself again by its elasticity. These cartilages are called *tarsi*, the *superior* and *inferior*. They are convex on the external surface, and concave on the inside; they have a thick margin corresponding to the ciliary edges of the lid, and a thinner turned towards the rim of the orbit. If we evert the upper or lower lid, these fibro-cartilages are easily brought into view. The superior is deeper than the inferior, in correspondence to the difference between the lids; the proportions, in this respect, are about as three to one. The inferior tarsus, like its eye-lid, is nearly of equal breadth throughout; the superior also corresponds in form to its lid, being broadest in the middle, and narrower towards the two extremities. The orbital edges of the tarsi are connected by fibrous expansions to the front of the orbit. These, which are sometimes called the broad ligaments of the tarsi, are firm distinct fibrous layers near the bone, with the periosteum of which they are continuous, becoming looser and thinner towards the cartilage. The ligament is strongest and most firmly attached to the tarsi on the temporal side of the orbits, where protection is most needed. Next to the tarsus is an arrangement of glands, disposed in parallel longitudinal clusters, called the *Meibomian glands*. These rows or clusters of glands are visible in the living subject, through the thin mucous membrane, and even conspicuous by their whitish colour. When examined with a magnifying glass, each row is found to consist of a congeries of minute roundish bodies; these are, no doubt, so many glands, each of which pours out its secretion into an excretory tube, running along the centre of the cluster, and terminating by an open orifice on the ciliary margin of the lid. These openings, which, although minute, are distinctly visible in the living eye, corresponding in number to that of the glandular rows, are called the ciliary ducts. There are two engravings in the work of SOEMMERRING, in which these minute structures are represented, of the natural size, and magnified, with great accuracy and fidelity. The whole number of the Meibomian glands, from their extreme minuteness, is very considerable. There are between thirty and forty rows of glands in the upper lid, but not quite so many in the lower: these clusters too are much shorter in the latter than in the former, in consequence of the different size of the two lids. The unctuous or sebaceous substance which they secrete anoints the lids, and prevents them from sticking together: after death it congeals into a solid form, and may be expressed from the orifices of the ciliary ducts, like minute white threads. Next to this arrangement of glands is the mucous membrane, or production of conjunctiva, which gives a smooth and polished surface to the interior of the lid, and facilitates the relative motions of the eye and lids.

The eyelids, although made up of so many distinct structures, are by no means impervious to light. One obvious use of them is to guard the eye from the access of light during sleep; however, so much light passes through them, that we can readily distinguish, in the day time, whether the light of a window fall on the face or be intercepted, although the lids may be closed; and persons, who usually sleep with their window and bed curtains drawn, adopt the expedient of leaving them open when they wish to rise early, generally finding the unusual impulse of light on the organs of vision sufficient to awaken them.

The several textures, or strata composing the lid, are connected together by a cellular tissue, which contains no fat; the eyes would be permanently closed if the lids were liable, like other parts of the body, to deposition of adipous substance; on the other hand, the cellular texture of the lids is easily filled with serous effusion, which, in erysipelatous and other inflammations, often closes them for many days.

Surgeons should attend closely to the ciliary margins of the lids, and make themselves well acquainted with their form, structure, and appearances. Here the common integument and the mucous membrane of the eye are continuous. The very edge of the lid is formed by a kind of covering intermediate between the two structures; it is not exactly a mucous membrane, like that which lines the palpebræ, nor integument like the common skin; it is red, thin, yet compact and dense, and adheres closely to the cartilage. The ciliary margin is the thickest part of the lid: it is a flat surface coming into contact with that of the other lid when the eye is closed; yet the inner edge, or that turned towards the globe, is a little sloped, so that a small channel is formed, in the closed state, between the palpebræ and the globe, for the passage of the tears.

At the outer edge of the ciliary margin are a number of pores in the integument, in which the cilia are implanted. The hairs which form the cilia, like those of the supercilia, are peculiar in their form and arrangement; each hair arises from a bulb, like the hairs in other parts of the body; it is slender at the origin, increases gradually in thickness, and then tapers off to a fine point; they are all curved, the convexity of the superior cilia being directed downwards, and that of the inferior upwards, so that they cross when the lids are closed. The superior are stronger and longer than the inferior; the middle are the largest and strongest, and they diminish gradually in length and strength towards the angles of the eye. Just behind the eye-lashes are seen the apertures of the ciliary ducts. Where the series of these openings ends towards the nose, and at the very inner or nasal extremity of the tarsus, there is a slightly prominent kind of papilla, of whitish colour, with a round aperture in the centre, called the punctum lacrymale.

The lids, though separated by a transverse slit, are united towards the temple and the nose, and the points of junction are termed the *angles*, or *canthi*, of the eye; the internal and external, or the greater and smaller. The internal, or greater angle, is rather rounded; the external, or smaller, is acute. By the tendon of the orbicularis, the internal angle is closely fixed to the side of the nose; the external is more loosely attached to the orbit by the broad ligament of the tarsi.

The size of the palpebral aperture is different in different individuals; in some persons a greater portion of the globe is habitually exposed than in others, and hence persons are popularly said to have large or small eyes, for the size of the globe varies but little. The organization of the eye-lids, as now described, enables them to execute their various useful purposes, of protecting the eye from violence and accident, of shielding it during sleep, of shutting out the light when it is too powerful, or when disease renders it offensive; of keeping the cornea smooth, moist, and free from impurities, and of disseminating the lacrymal fluids over the organ. The cartilage gives to the lid its uniform smooth surface; the Meibomian secretion anoints their edges, and prevents them from adhering during sleep, or occasional contact; their rapid motion in winking, with the concurrent rolling upwards of the globe, and approximation of the eye-lashes, shuts out extraneous substances, and preserves the cornea constantly clear for the transmission of light, whilst the polished mucous surface glides without the smallest friction over the equally polished globe.

Conjunctiva.—The name denotes that it joins or unites the globe to the lids; it is sometimes called *adnata*, from its growing or adhering to the surface of the eye. Indeed, it adheres so closely to the front of the organ, that it ought, strictly speaking, to be enumerated among the tunics belonging to the globe. The line of the cilia, in each lid, may be considered the boundary between the skin and the mucous membrane, the point of union of the two structures. The conjunctiva, then, is perforated at the ciliary margin of the upper lid, by the ciliary ducts; it lines the posterior or inner surface of that lid, extending a little way above the upper or orbital edge of the tarsus; from the lid it turns over the globe, covering two-thirds of the eye, viz. the anterior portion of the sclerotica, and the cornea; it is reflected from the inferior portion of the globe to the posterior surface of the under lid, which it lines: reaching the ciliary margin of the lower lid, it is perforated by the ciliary ducts, and again becomes continuous with the skin.

Thus this membrane is reflected from the palpebræ to the whole circumference of the globe, forming a circular fold, which, at the point of reflexion, corresponds to the fat of the orbit. This angle of reflexion is the boundary between the external surface and the orbital contents; it opposes the passage of an instrument, or any extraneous substance. It is a loose fold, and loosely connected to the surrounding parts, yielding to the motions of the globe with perfect facility, drawn smoothly over the convexity of the sclerotic, when the eye is moved in a contrary direction, and forming two or three loose folds on the opposite side, or that towards which the eye is turned.

The conjunctiva is not only connected with, but constitutes part of the external surface of the body; it is actually exposed to the air when the palpebræ are open, though it is completely shut up when they are closed. It is a mucous membrane, having a polished surface, from which a mucous exhalation takes place, and a cellular surface adhering to the parts which it covers. It is one uninterrupted membrane; it differs, however, in structure and appearance in its different parts. Hence anatomists have designated that portion which lines the lids as the *conjunctiva palpebralis;* and that which covers the eye as the *c. oculi;* the latter part has been further subdivided into the *c. corneæ*, and *c. scleroticæ*. All these, however, agree in the circumstance of having a smooth and polished surface, and of producing a mucous exhalation.

The *c. palpebralis* is a thin vascular membrane, of reddish colour from numerous visible vascular ramifications, and semi-transparent, so that you may see through it the cartilage, and the parallel rows of Meibomian glands; it is consolidated to the ciliary margin of the tarsus, and it adheres closely, but less firmly, to the rest of the cartilage. SOEMMERRING, who has represented the palpebral conjunctiva in the 15th fig. of his second plate, mentions in the description its *silky and as it were warty* structure. MUELLER* says that a great number of mucous glands is scattered over the surface, and that they give to it a somewhat velvety appearance. EBLE[*] considers that this part of the membrane has a papillary structure, analogous to that of the tongue or the Schneiderian membrane; that this structure is more obvious after death with congestion in the vessels of the head; and that it secretes the mucous which lubricates the surface of the eye. He has given excellent figures of this corpus papillare, as he calls it, both of the natural size and under various degrees of microscopic enlargement.

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* *Erfahrungs-sätze*, pp. 5 and 6.

The *c. scleroticæ* is of a white colour, thick and pulpy in its texture, and, in conjunction with the dead white sclerotica, gives to this part of the eye that appearance which is designated by the popular expression, white of the eye. It is remarkable for the almost entire absence of vessels carrying red blood; in its natural state we see merely a few small red vessels creeping on its circumference from the lid. It is connected to the parts on which it lies by a loose cellular texture, which easily falls into folds, and permits the globe of the eye to be moved in all directions. These folds become the seat of serous effusion in certain inflammatory affections of the eye.

The *c. corneæ* differs remarkably from both portions of the membrane just described, so much so, that one doubts, at first, whether it really is a part of the same structure.[†] No vascular ramifications are visible in it, and it is so closely connected to the corneal substance, that you cannot separate it by dissection in the recent eye: we are satisfied, however, that the cornea is covered by a continuation of conjunctiva. In the first place, the anterior surface of the cornea possesses the same acute sensibility as the rest of the conjunctiva. In fact, the sensibility is greater in this than in any other part of the eye, while the proper corneal laminæ appear insensible. Changes produced by disease are often continued from the conjunctiva scleroticæ to the cornea. The prolongation of red vessels, and thickening of texture, bring the cornea to such an identity of character with the conjunctiva, that the boundary between them is hardly distinguishable. In certain animals a strong proof is afforded that the front of the cornea is formed by a continuation of the palpebral lining. In the serpent tribe, which annually shed their epidermis, the front of the cornea comes off with the rest of the external surface of the body. In the eel the anterior surface of the cornea is often drawn off, when it is skinned. A subterraneous animal (zemni, slepez, mus typhlus, Lin.) whose habits and manner of living are analogous to those of the mole, has the eye covered with hairy integument like the common skin of the body.

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[*] *Ueber den Bau und die Krankheiten des Bindehaut der Auges*, p. 19—29, Pl. I. and II.

[†] The continuation of the conjunctiva over the cornea is doubted by EBLE, (*lib. cit.* p. 60); and denied by MECKEL, (*Handbuch*, b. iv. p. 59.)

Lacrymal organs.—Under particular circumstances, the surface of the eye is washed by a more copious secretion, of different character from the mucous conjunctival exhalation, which, not being conveyed away fast enough by the ordinary excretory apparatus, is poured over the lid, taking the name of tears. This fluid is secreted by the *lacrymal gland*, which is a small gland of conglomerate texture, seated in the orbit, within the external angular process of the frontal bone. Its excretory ducts open on the surface of the conjunctiva, above the external angle of the eye; there are about seven ducts, which are scarcely to be seen in the human eye, except under favourable circumstances. In the eye of the horse or bullock they are of sufficient magnitude to admit a small probe. The secretion of the lacrymal gland is a watery fluid, containing a considerable saline impregnation, hence saltish or brackish to the taste, and, when copiously poured out, it produces a temporary irritation and redness. Its discharge is excited by the direct irritation of foreign bodies, particularly those of acrid properties; by that of recent conjunctival inflammation, more particularly by inflammation of the sclerotica, and by mental emotion. The fluid which moistens the eye, whether conjunctival or lacrymal, is absorbed by the excretory apparatus, and conveyed into the nose. The *puncta lacrymalia* already described are the external commencements of two small tubes, which go towards the internal angle of the eye, and there terminate in the lacrymal sac. These tubes are called the *lacrymal canals*, or *ducts*; they converge, the superior passing inwards and downwards, and the inferior inwards and upwards; they are about a quarter of an inch in length, and open at one and the same point into the *lacrymal sac*. This *bag*, about the size of a small horse-bean, and oval, is seated in the bony excavation on the inner side of the anterior orbital aperture. Its superior end is rounded; the inferior, slightly contracted, forms a tube half an inch long, and larger than a crow quill, called the nasal duct, which descends into the nose. The lacrymal bag closely adheres to the bony excavation which lodges it, being covered, on its anterior or exposed surface, by a firm fibrous layer attached to the edges of the bony groove. This anterior surface is further covered by the fibres of the orbicularis and the skin; the tendon of the former crosses it transversely a little above its middle, so that one-third of the bag is above, and two-thirds below the line of the tendon. The lacrymal canals open just behind this tendon, on the outer or ocular side of the bag. The communication with the nasal duct is the inferior extremity of the sac, a slight constriction marking the distinction between the bag and duct. The latter passes from above obliquely downwards, and a little backwards, enclosed in a bony canal, and opens in the inferior meatus narium, on the outer side of the inferior turbinated bone, which must be cut away in the dead body to expose the aperture; the latter is then seen as an oblique slit.

The lacrymal sac and the nasal duct are lined by a thick pulpy mucous membrane, resembling in its structure the Schneiderian membrane of the nose, and containing, like that, numerous small mucous cryptæ. The lacrymal canals, and the puncta lacrymalia, are lined by a thinner and more compact membrane continuous with the conjunctiva. Thus these lacrymal passages establish a connexion, by continuity of surface between the eye and nose. The fluid taken up by the puncta lacrymalia is conveyed into the sac, and it then descends into the nose. We do not exactly understand the mode in which the circular orifices of the lacrymal canals suck up the fluid. A small space is seen in the inner angle of the eye, between the two lids, towards which the tears flow, and at which the small triangular canal formed between the closed lids terminates; this is called *lacus lacrymarum*, and the prominent papillæ, in which the puncta lacrymalia are perforated, are turned towards this space. When the secretion of tears is much increased by any of the exciting causes which I have mentioned, the fluid is poured out faster than it can be absorbed by the puncta, and it flows over the surface of the cheeks.

In the internal angle of the eye, near the puncta lacrymalia, is a small prominent body of a reddish colour, called the caruncula lacrymalis; this part you will understand better by looking at it in the living eye than by examining it in the collapsed and shrivelled state which it exhibits in the dead subject, and in preparations. It is a congeries of glandular bodies, similar in structure to the Meibomian glands. Between the caruncula lacrymalis and the globe of the eye, is a small fold of conjunctiva, called the *semilunar fold*, which appears to be a rudiment or imperfect exhibition of that structure which in quadrupeds constitutes what has been termed a third eye-lid; it is situated vertically between the upper and lower lid.

CHAPTER I.

Pathology of the Eye—Inflammation—Classification of Ophthalmic Diseases.

SECTION I.—PATHOLOGY OF THE EYE.

WITHIN the small compass of the visual apparatus, we meet with a greater variety of structures than in any other part of the body. We have seen, indeed, in the preceding description, that the eye with its appendages exhibits specimens of every animal tissue in the body.* We find in it bone, cellular and adipous substance, and blood-vessels; mucous, fibrous, and serous membranes; the conjunctiva exemplifying the first, the sclerotica, the sheath of the optic nerve, and the lining of the orbit, (*periorbita*,) the second, the surfaces containing the aqueus humor, the third; muscular, nervous and glandular parts; common integument and hairs. Besides these, it contains several tissues of peculiar nature, to which there is nothing strictly analogous in other parts; these are the iris, the ciliary body, the choroid coat, and the transparent media. Each of the latter has its own characteristic structure; the cornea, the crystalline lens, and its capsule, the hyaloid membrane, and the vitreus humor, resemble each other only in being transparent. Most of these parts are highly organised, copiously supplied with blood-vessels and nerves.

By the nature of its organization, by its office and its situation, and by the connexions between it and other parts of the system, the organ of vision is exposed to numerous external and internal sources of disease. The aid of this sense is required on most occasions; hence the eyes are incessantly exercised during our waking hours. In many instances they are excessively exerted, as by the numerous persons engaged in the various mechanical occupations requiring close attention, by artists, students, and literary characters. The situation of the eye lays it open, not only to accidental injury, but to various external influences.

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* I conclude that Beer means to express this circumstance in the singular paragraph, with which he begins his work on Diseases of the Eye.

"As man, in relation to the universe, must be regarded as a little world, (microcosmus,) so must we consider the eye in relation to the individual man, as a microcosmus, in which his soul and body are reflected."—*Lehre*, vol. i. p. 1.

The same view is given, in nearly the same words, by Professor Rosas.

"By its intimate connexion with the rest of the organization, and their consequent mutual influence, the eye may justly be regarded as the mirror of the soul and the body. Further, as it exhibits in miniature a repetition of the whole bodily structure, it may be considered to bear to the latter the same relation that the body, as a little world, bears to the universe."—*Handbuch*, i. s. 485.

As there is a common source of nutrition and circulation, and one centre of nervous energy, pathological principles must be the same for the whole body. In addition to the mutual dependence and influence resulting from this arrangement, there are numerous and important relations between the organ of vision and other parts of the animal economy. The fifth pair of nerves and the excretory part of the lacrymal apparatus connect it with the nose. A close, reciprocal influence is established between this organ and the brain with its membranes, by means of the nerves which enter the orbit, by the fibrous sheath of the optic nerve, and the periorbita. By the connexions of its blood-vessels, it must participate in the determinations of blood to the head. The communications between the great sympathetic, and the third, fifth, and sixth cerebral nerves, as well as the continuity of mucous surface, establish a connexion between the abdominal viscera and the eye, capable of explaining many points in pathology and treatment. Again, the eye is a part of the external surface of the body, connected with the integuments through the medium of the conjunctiva, which may be regarded as a modified cutaneous covering. Hence it participates in the various diseases of the skin, not only in the acute affections, such as smallpox, scarlatina, and measles, but also in the more chronic disorders. Hence, too, perhaps, we may explain the advantageous effect, in ophthalmic disease, of cutaneous irritation, and of attention to the condition of the skin generally.

It will be clear, from the preceding considerations, that the affections of the eye, as a part of the organic system, come under the general laws of disease and treatment. We must, however, not lose sight of its peculiar tissues, and of the modifications which fit the organ for its especial office. It would be a most fatal error to insulate the diseases of the eye from the rest of pathology, to consider them as merely local ailments, and treat them only by remedies applied to the part. It would also be a mistake, though much less serious, to overlook the peculiarities of ophthalmic disease, and, trusting entirely to general means, to neglect all applications to the part.

When we consider that the component parts of the eye are so numerous and diversified in organization, and that each of these is subject to the same diseases, and consequent changes, which are incident to analogous structures in other parts; that they are not only liable to common disease with its various results, but that they exhibit important modifications of diseased action, dependent on peculiarity in the exciting causes, or on specific states of constitution, whether original or acquired; and that this complex and delicate organization is exposed to numerous and powerful causes of disturbance, we can easily account for the numerous distinguishable forms of ophthalmic disease. If each of these should be regarded and named as a distinct affection, we need not be surprised at the long catalogue, which ophthalmic nosology would thus exhibit; that TAYLOR should have given an "*Exact Account of Two Hundred and Forty-three different Diseases to which the Eye and its Coverings are exposed*,*" and that Dr. ROWLEY should have written "*A Treatise on One Hundred and Eighteen principal Diseases of the Eyes and Eyelids.*"† We shall find, however, on closer inquiry, that this numerous offspring belongs, nearly all, to one family; that, although designated by distinct appellations, they are not distinct diseases, but that the great majority are merely forms and results of one morbid affection, viz. inflammation.

SECTION II.—INFLAMMATION.

THE question then presents itself, what is inflammation? There ought to be no difficulty in answering it. We are continually talking of inflammation; almost constantly occupied in observing and treating what we call inflammations. The existence of this morbid affection is more and more generally recognised as the source of disease; and it seems likely, in the end, to spread itself over nearly the whole field of nosology. It has been carefully investigated by pathologists and practitioners, and much has been written on it; but the real nature of the process is as yet imperfectly known. If you should ask a surgeon, or look into a book for an explanation, you would learn that inflammation consists in the assemblage of four alterations in a part; viz. redness, heat, swelling, and pain. The word inflammation, from *inflammo*, denotes the most striking character of external inflammations; that is, the increased heat of the part. The other items in the nosological description are drawn from the same source, and by no means derived from a general survey of the process as it occurs in all structures. As a mere description, it is not applicable to the eye in many cases. In some conditions of the cornea, the iris, and the crystalline capsule, which are regarded as inflammations, there is no visible swelling, no redness, nor can we detect the existence of heat or pain. Again, in the case of parts removed by their situation from direct observation, as the retina and hyaloid membrane, or the various internal organs of the body, we cannot determine whether the four circumstances regarded as criteria of inflammation are present or not.

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* 8vo. Edinburgh, 1759.

† London, 1790.

The question, however, what is inflammation? is not satisfactorily answered by enumerating these four changes, even if we admit that their assemblage generally characterises the process. Redness, swelling, heat, and pain, are the symptoms of the disease, the external signs that denote its presence. We must inquire, therefore, what is the internal change that produces these four external signs? what is the alteration in the capillary circulation, that gives rise to redness, swelling, heat, and pain? This is not yet known. We understand something of particular inflammations, as those of the skin, cellular tissue, serous and mucous membranes, &c., because we can both observe their progress, and examine the parts affected; but, when we attempt to explain the nature of inflammation generally, we are investigating an abstract term. In this point of view it is a creation of the mind, not conveying any sensible ideas; its acceptation, therefore, cannot be defined or limited by reference to nature, our only safe guide.

The most general notion that we can form of inflammation, is that of increased activity in the capillary circulation, whether evidenced by increased size of vessels and redness, or by deposition of new matter and consequent visible changes, such as thickening or opacity, increased or altered secretions, and unnatural adhesions. The phenomena of inflammation, when it is seated in an external part of some size, as the hand and fore-arm, for example, show that an increased quantity of blood enters the inflamed part, and circulates through it. The throbbing and the increased size of the arteries, the distention of the venous trunks, with the fulness of the small vessels, as evidenced by the external redness, and by the unusual red colour of all the textures of the inflamed member, with the obvious increase in the number and size of their capillaries, prove that an increased quantity of blood enters the part. It seems to me equally evident that a larger quantity circulates through it. Blood flows much more freely from an incision into an inflamed part than into a sound one. This is strikingly exemplified in the division of the integuments and cellular membrane in phlegmonous erysipelas; both arteries and veins bleed so freely on such occasions, that twenty or thirty ounces of blood are often lost in a few minutes. When an operation is performed on an inflamed part, or in its immediate neighbourhood, the blood is thrown more forcibly from the divided vessels, and we find it necessary to tie a much greater number than under other circumstances. The fulness of the veins in an inflamed limb is another unequivocal proof of the same point: these vessels could not be distended, if the blood sent to the inflamed part stagnated in it, as some have supposed. In a case of inflamed hand and fore-arm, requiring general depletion, I have tried the experiment of opening a vein in each arm at the same moment. Three times more blood flowed from the vein of the inflamed limb, than from that of the sound one, in the same time. We are thus led to regard the phenomena of inflammation, that is, the changes which occur in the part itself, as dependent on an increased activity in the circulating system. But it is not merely increased activity, that would produce increased nutrition, augmentation of bulk, as in the growth of the stag's horn, the enlargement of the uterus and the mammary glands in pregnancy; there must be an alteration in the mode of action; but in what that alteration consists we are unable to determine.

The agents of inflammation are the capillary vessels, which carry on the active business of the animal economy, performing the various processes of nutrition, growth, secretion and excretion. We do not yet know the differences of arrangement or action which lead to the various results of vascular exertion; we cannot tell how it is that the capillaries of one part deposit bone, those of another muscle, of a third membrane; how some secrete bile, others urine or saliva. As we know nothing of the causes which produce these striking differences, it is not surprising that the intimate nature of the process called inflammation should still be a mystery to us.

The various inquirers who have investigated the subject experimentally, endeavouring to found a theory of inflammation on observation of the process in living animals, especially with the aid of the microscope, have come to very different, indeed opposite conclusions. Some have seen in inflammation an increased flow of blood to the part, and a more active transmission of it through the vessels; others assert that the circulation is obstructed. That there is increased activity of the capillaries has been generally believed; yet elaborate attempts have been made to shew from microscopical observations that these vessels are in a state of debility, and do not exert themselves so much as in the natural condition. These and other similar contradictions must convince us, that the exact nature of that deviation from the normal or healthy state of the capillary circulation, which constitutes inflammation, is as yet unknown; and will save us the trouble of examining the speculations which have been founded on microscopical observations of the circulation in the transparent parts of living animals.

Varieties of inflammation; acute and chronic.—Inflammation is not one and the same process under all circumstances; if it were, pathology and treatment would be very simple. The phenomena, which it exhibits, vary considerably, and the eye, from its position, and peculiar organization, affords the most favourable opportunity in the body for the study of these varieties. In the first place, the affection differs in degree; there may be more or less of the inflammatory disturbance. This distinction is denoted by the terms *acute* and *chronic*. Severity of symptoms and rapidity of progress characterise the former; the opposite attributes of mildness and slowness belong to the latter. I do not mean to represent that there are two degrees and no more: we may have every gradation of the affection, from that in which we barely recognize the existence of increased action, to the violent unnatural exertion, in which all the ordinary functions are perverted or interrupted, and even the very structure changed or destroyed. These diversities are only pointed out in a general way by the epithets acute and chronic, the shades of difference between the two extremes being numerous and indefinite. The terms themselves are not precisely contrasted in meaning; the epithet *acute* marks the violence of the symptoms; while *chronic*, which is equivalent to lasting or enduring (from χρονος, time,) denotes their duration: it is this violence that particularly attracts notice in the former case, while the continuance of disease is the most striking circumstance in the latter. Acute inflammation is also called active, violent, or phlegmonous; the latter term being derived from the Greek φλεγμων, the name given to that active inflammation of the cellular texture and skin, which generally terminates in abscess. Thus acute inflammation is a violent disturbance which cannot last long; unless cut short by proper treatment, it soon produces mortification, suppuration, or effusion; like fire, it soon burns itself out. Chronic inflammation is also called languid, slow or indolent. Its characteristics differ in several important points from those of the acute kind. The vascular distension and disturbance are not so considerable; the redness much less, often hardly perceptible; the pain is slight or absent. Hence it may arise and proceed for some time, without the patient being aware of its existence. Although in these respects chronic seems a less alarming disturbance than acute inflammation, it is more serious in another point of view: it produces interstitial deposition and consequent change of structure, which often impair or destroy the functions of the affected part.

Some are of opinion that there is a difference, not only in degree, but in kind, between acute and chronic inflammation. They admit preternatural excitement, and consequently increased exertion, as the essence of the former; but they suppose the latter to be the result of debility, and to consist of a weakened or atonic state of the capillaries. Thus we read and hear of active and passive or atonic, of sthenic and asthenic inflammations. Believing inflammation to be increased activity or exertion of the capillaries, I consider the expressions, passive, atonic, and asthenic inflammation, as applied to the state of the inflamed part, to be contradictory in terms. It is true that inflammation may occur in weak as well as in strong states of body, and that the local phenomena, the sympathetic disturbance of other parts, and the treatment will differ materially in the two instances. Moreover, an unhealthy, and consequently, in a certain sense, weak state of the constitution, may remotely cause many inflammations; but I cannot trace the disturbance, under these circumstances, to weakness of the part, and still less can I refer the phenomena to a weakened or passive state of the vessels. On the contrary, when we observe inflammations occurring in weak individuals, as in the advanced period of typhus, when the patient is in the lowest condition of debility, we still find the local changes and results, which under other circumstances we refer, without hesitation, to increased vascular action. If there are any inflammations in which the capillaries are less active than in the healthy condition, I am not acquainted with them.

The same observation is equally applicable to the expressions, *arterial* and *venous* inflammation, or congestion. If we trace the arteries and veins of a part, we soon come to a point, at which we can no longer distinguish them. The capillary system, in which inflammation resides, is a net-work of minute ramifications, which we cannot unravel. How then can we ascertain whether arteries or veins are exclusively affected? Can we suppose such exclusive affection probable, or even possible?

The *acute* and *chronic stages* of inflammation are often spoken of. If we survey attentively any particular case, we do not find that it is one and the same process throughout: there is a succession of phenomena. The disturbance commences insensibly, gradually increases till it acquires a certain development, remains for a time at that point, and then gradually recedes, till the part recovers its healthy state. The whole of this course passes under the name of inflammation, though the various parts of it differ considerably from each other. If we were to divide each inflammation into three periods, of *formation*, in which the symptoms arise and proceed to a certain extent, of *full development*, and of *decline*, we should find that the two first are nearly of equal length in most cases of active inflammation; but that the portion of time, between the point at which the symptoms begin to lessen and complete recovery, varies much in its length in different instances. When inflammation has been violent, and allowed to pursue its progress uncontrolled, more particularly if the exciting causes have continued to act, the disturbance lasts in a greater or less degree for a long time, although the more urgent symptoms may have been lessened. The part is still inflamed, but the redness and pain are less, the interruption of function is not so great. This minor degree of inflammation, which may continue for a long time, is called the *chronic stage*, while the former period, in which the symptoms were violent, is termed the *acute stage* of an inflammation. If the disease be actively treated, if its progress be arrested by judicious means, the part recovers quickly, and we can hardly say that any chronic stage occurs.

Besides employing these terms to designate the different portions of one and the same inflammation, some have contended that the two periods are totally different in their nature; that increased exertion is the essence of one, weakness of the other; and that a corresponding difference of treatment is necessary, the chronic stage requiring, as they represent, tonic and stimulant means. These views seem to me altogether erroneous. Without asserting that there is no difference between acute and chronic inflammation in general, I have no hesitation in affirming that the acute and chronic stages of one and the same inflammation do not differ in their essential nature. Thus we find that the acute form passes into the chronic, and that the latter may relapse into the acute. When inflammation of the eye has reached the chronic stage, all the phenomena of acute inflammation may be re-produced by exertion of the organ, imprudence in diet, or other causes. Finding that, within a short period, one stage can pass into the other, and *vice versa*, how can we admit the notion that the two are opposite in their nature and in the treatment they require?

Various effects.—Inflammations differ in their effects; these differences depending principally, though not entirely, on differences in the degree of disturbance. *Irritation*, and *congestion* or *determination of blood*, may denote the early stages in the deviation from health, before the disturbance has attained such a degree as to warrant us in calling it inflammation. Then come *hemorrhage*, *effusion of serum*, of *lymph*, or of *pus*, *ulceration*, and *mortification*. *Softening*, *thickening*, and *induration*, *loss of transparency*, *preternatural adhesion*, are, for the most part, more remote consequences of inflammation; while, on the other hand, the disturbance often passes away without any ill consequence to the part, the symptoms either ceasing suddenly, or subsiding more gradually, both these modes being called resolution.

So much hardness is sometimes produced by interstitial deposition in the inflamed part and its subsequent organization, that the part is said to become *scirrhous*. The production of *scirrhus*, and its subsequent ulceration so as to assume the form of cancer, are mentioned as common consequences of inflammation, even in the modern surgical works of France and Germany.* This seems to me an erroneous view of the subject. The consequence of inflammation is simply induration, often with enlargement: in the part thus altered you can always discern the characters of the natural structure. In scirrhus the natural structure is quite lost, and a new organization substituted. Confining the term scirrhus to that induration which precedes cancer, and terminates in the destruction of the part and of life, I have never seen it as the result of inflammation, either in the eye or any other parts.

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* ANDRAL, *précis d'anat. pathol.* t. i. p. 501; BROUSSAIS, *Examen des doctrines.* Propositions de Médecine; prop. 196. *Dictionnaire de Med. et Chir. Pratiques*, t. iv. p. 444. LANGENBECK *Nosologie*, b. i. p. 316—318.

Common and specific.—That the state of the constitution should modify inflammation is a circumstance which might be expected. When it occurs in a healthy individual, from an ordinary cause, it is called *common* inflammation; this may be exemplified by the effect of a wound on a person in good health. The terms, *true*, *proper*, *simple*, *idiopathic* inflammation are used in the same sense. If the patient be young, strong, and of full habit, the inflammation will be acute, active, or phlegmonous in its character. The terms, *specific*, *sympathetic*, *spurious*, *mixed*, are applied to those modifications which inflammation assumes in various states of constitution, more or less different from the healthy condition. A peculiar character will be given to the inflammatory process by certain differences of organization, or natural defects of constitution, such as the scrofulous and rheumatic, by acquired conditions of a morbid kind, as in gout and syphilis, or by the specific influence of the exciting cause, as in smallpox, measles, scarlatina, malignant pustule, and all other contagious diseases. In the instances last mentioned, the disease is produced by one particular cause, and no other. The specific character of the inflammation, therefore, arises from the cause in these instances, while in the others, it has its source in peculiarity of constitution in the affected individual. Under these various conditions, the appearances of inflammation will differ very much from those which it exhibits in persons of good natural constitution, and in sound health. Frequently, however, specific is so much like common inflammation, that the distinction is difficult. The extremes are well marked, but they are connected by numerous intermediate gradations.

Varieties from difference of texture.—Inflammations differ according to the texture of the affected part. When we find that inflammation is an increased action of the blood-vessels, that its seat is in the capillaries of a part; when we know, at the same time, that the arrangement of these is peculiar in each tissue and organ, we naturally conclude that the inflammatory process will have its peculiar characters in each structure. From this source we deduce differences, not only in the characters of inflammation, but also in its effects. Hemorrhage occurs frequently in the inflammation of mucous membranes, rarely in other parts; effusion of lymph, adventitious membranes, and adhesions are common in the serous, hardly ever observed in the mucous membranes. Ulceration, which is a frequent result in the skin and mucous membranes, is hardly seen elsewhere.

No organ in the body presents so favourable an opportunity as the eye, for observing the varieties of the inflammatory process, which depend on difference of structure. It contains specimens of all the animal tissues, and these are, for the most part, immediately open to our observation, so that the study of ophthalmic diseases constitutes an epitome of general pathology. In this point of view nothing can be more interesting and instructive than an observation of the varieties presented by inflammation of the conjunctiva, sclerotica, cornea, iris, and retina.

Other modifications.—Inflammation is also modified by many other circumstances, which influence the body more or less powerfully, such as temperament, age, sex; individual constitution; mode of life, as respects diet, clothing, exercise, sleep, and other habits; season, climate, state of the weather and atmosphere, and the unknown agencies which produce endemic or epidemic disease.

When we consider the numerous distinct component parts of the eye, the several circumstances which modify the inflammatory process in those structures, and the varied results which it may produce in each, we shall be enabled to account for the great number of ophthalmic diseases. If the length of the list should frighten the student, he must remember that these various affections may, for the most part, be referred to a common origin, that they partake of a common nature, and that, as they are nearly all the offspring of inflammation, so the treatment of them is, in essential circumstances, similar. The more attentively we observe the phenomena of disease, and consider the effects of remedies, the more we shall be led to adopt simplicity of treatment, and the less confidence shall we place in complicated plans, or great diversity of remedial means.

SECTION III.—ARRANGEMENT OF THE SUBJECT.

THE arrangement adopted by BEER in his large work, is a simple one. He treats, in the first place, of inflammation, and then of its consequences. However, we cannot refer all the affections of the eye to one or the other of these heads; and thus BEER is obliged to adopt a third division, a catalogue of undefined affections, which do not come under either of the preceding divisions. As we do not know the exact nature of the inflammatory process, as the pathology of some parts of the eye is yet in an imperfect state; and as we have seldom an opportunity of examining the results of ophthalmic diseases after death, we are unable to present a classification of those diseases founded on clear and unequivocal principles, and in all respects satisfactory. If it were required to give an arrangement of all diseases and defects of the eye, that is, of all those matters upon which our professional opinion may be required, I should be inclined to adopt a greater number of divisions than BEER has done.

Injuries might be considered first; *inflammations* would occupy the second division, and they might be conveniently distributed, according to their seat, into those of the *orbit*, *lids*, and *globe;* those of the latter being subdivided into the *internal* and *external*. This head would of itself embrace a long catalogue of diseases. Thirdly, I should speak of the *consequences* and *concomitants of inflammation*, as they appear in the individual parts of the apparatus; fourthly, of *tumours* in the lids, in the globe, and in the orbit; fifthly, of *malignant affections* of the globe, such as scirrhus, cancer, fungus hæmatodes, melanosis; sixthly, of affections not referrable to inflammation; and the seventh head might comprise congenital peculiarities or defects. Under these divisions we might conveniently enough arrange every thing which can be the subject of professional consideration respecting the eye.

I propose, in the following sheets, to treat of all these subjects, though not under the same arrangement. The plan which I adopted in the lectures delivered at the London Ophthalmic Infirmary, was not chosen as being the most scientific, but as the best calculated for the instruction of students: I see no reason for altering it. I shall begin with the inflammations of the globe, taking first the well marked acute affections, particularly the external, as the best calculated to exemplify the causes, symptoms, and progress of inflammation, and the effects which it is capable of producing in the organ, as well as to illustrate the principles of treatment. Inflammation of the entire globe will be considered first; then the external, and afterwards the internal inflammations. In speaking of the external ophthalmiæ, an opportunity will occur for considering the subject of extraneous substances in the eye, and wounds of the organ. The following subjects will follow in the order in which they are mentioned. Affections of the lids; consequences and concomitants of inflammation in each part of the globe, with any other changes, and such congenital varieties of formation as may require notice; cataract; artificial pupil; amaurosis, and other defects of vision; general affections of the globe, dropsy, atrophy, malignant diseases; affections of the lacrymal organs; affections of the orbit.

Until a recent period, inflammation of the eye has been treated of in too general a point of view, especially by the surgical writers of France and England: it has been described and spoken of as a single affection under the term ophthalmia. The subject is thus considered in the treatise on *the ophthalmy* of the late Mr. WARE, in the work of SCARPA, and by his French translators, although it had been much better understood many years before by the Germans, as will be clearly perceived by reference to the excellent Essay on Iritis of J. A. SCHMIDT, and to the *Ophthalmologische Bibliothek*, which he edited in the very beginning of the present century in conjunction with professor HIMLY.

The term *ophthalmia*, according to its etymological import, would embrace all inflammations of the eye. Now it is evidently impossible to comprehend in one description, the various inflammations affecting its very dissimilar structures. Many of these have but few points of resemblance. What similarity of character could we expect between inflammation of the conjunctiva, sclerotica, cornea, iris, retina? Inflammations of the external and internal tunics differ widely. Hence the attempt to embrace all these affections under one description, instead of elucidating the subject, can only lead to confusion and obscurity. It produces an incoherent jumble of symptoms belonging to affections essentially distinct, where the general description is overpowered by the numerous limitations and exceptions, so that no clear view is given of any part of the subject. The general descriptions of ophthalmia are usually applicable only to external inflammation of the eye, more particularly that of the conjunctiva, while the other forms of the affection are entirely neglected. The important internal inflammations were entirely overlooked by English writers until within a very few years: the subject is not mentioned by Mr. WARE.

The whole globe may be inflamed at once; but this is not a common occurrence. In general, inflammation affects only the external or internal tunics, and often only one at a time.

Ophthalmic inflammations might be classed, either according to the structure in which they are seated, or according to our opinions respecting the nature of the inflammation itself. In the latter case it is divided into idiopathic or common, and sympathetic or specific. I prefer, however, the arrangement according to its seat; it is the most simple, and least liable to controversy or mistake.

Inflammation of the eye is usually limited in its origin, and becomes more general in its progress. It commonly commences in one structure, is confined at first to that, and does not extend beyond it, if judiciously treated. But if it is not attended to in the outset, if suitable means are not adopted to check its progress, it readily extends beyond the original seat of disease, and perhaps ultimately embraces the whole of the organ. Mr. WARDROP, in his *Essays on the Morbid Anatomy of the Eye*, takes up each of the component structures, and gives an account of the changes which may be observed in it. This course of proceeding is very proper in a work illustrating the morbid anatomy of the organ, but it is not so applicable to our present purpose of considering the nature and treatment of the diseases to which it is subject; with this view, instead of insulating the affections and changes incidental to each tissue, it is better to turn our attention to those aggregates of phenomena, which most commonly appear in practice.

CHAPTER II.

Inflammation of the Globe (Ophthalmitis.)

I SHALL first speak of inflammation affecting the whole eyeball; of common inflammation seated both in the external and internal structures. This affection, which is by no means of common occurrence, is called by BEER *ophthalmitis idiopathica.* Some very serious exciting cause is required to produce it, and it occurs chiefly in robust individuals of full habit. It is most frequent in the right eye.*

Symptoms and progress.—When this general inflammation of the globe is fully developed, it is characterised by very considerable pain, increased external redness, more or less external swelling of the part, by increased lacrymal discharge, and by redness and swelling of the upper lid. In the earliest stage we can see the sclerotica red as well as the conjunctiva; the pink redness of the former membrane, and the distended net-work of its vessels are seen through the latter. But vascular congestion rapidly increases in the conjunctiva; its texture swells, and thus the fainter pink tint of the sclerotica is concealed. The conjunctival redness, at first slight, becomes deeper and deeper, and at last reaches the full intensity and brightness of scarlet cloth.

The pain is always a leading symptom, and one to which the patient immediately adverts. It is exceedingly severe, and is described sometimes as acute, sometimes as of a dull aching kind, and sometimes as conveying a sense of throbbing and burning. Very commonly the patient feels the eye tight, as if it were too large for the orbit, and about to burst from it. The pain is by no means confined to the front of the eye, but is deep seated, and extends to the surrounding parts, as the brow, cheek, temple, and back of the head.

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* This seems to be the case with ophthalmic inflammation generally. Of one hundred and thirty-four cases commencing in one eye, ninety-five began in the right, thirty-nine in the left. Mr. MACGREGOR observes of purulent ophthalmia, "It is found that the right eye is more frequently affected than the left. It is also in general more severely affected, and the sight of it is more frequently lost."—*Transactions of a Society for the Improvement of Med. and Surg. Knowledge*, Vol. iii. p. 55.

The redness is inconsiderable at the commencement, but it gradually increases, and ultimately the surface of the eye assumes a bright red colour.

The conjunctiva, which is at first the seat of mere vascular fulness, begins to swell, from effusion into its texture, and into the copious cellular tissue, which connects it to the sclerotica. It is raised above the level of the cornea, forming a broad firm ring on the front of the eye; it rises higher and higher, often over-lapping the edge of the cornea, so as to hide a part of it. This bright scarlet, broad, and elevated ring of conjunctiva, projecting beyond, and surrounding the cornea, is acutely sensible; it is technically called *chemosis*, and in the affection which I am now describing it may be termed *true inflammatory chemosis*. The distension of the conjunctiva is limited in front by its adhesion to the corneal laminæ, behind, by the pressure of the surrounding parts; hence its form of a broad ring on the front of the eye, where the swelling of the membrane is not effectively opposed by the eye-lids. The appearance depends on an interstitial effusion of lymph from the vessels of the inflamed membrane under high excitement, analogous to that which takes place in other acute inflammations.

The tumid state of the conjunctiva is not owing to the effusion of blood into the cellular texture, as SCARPA[*] very unaccountably supposes, confounding the inflammatory symptom called chemosis with ecchymosis. He has, upon this erroneous supposition, proposed the making of incisions through the tumefaction to allow the escape of effused blood. There is in some treatises a distinct chapter upon chemosis, as if it were a particular disease of the eye; it is however merely an effect of acute inflammation affecting the conjunctiva, and its characteristic form is derived from the loose sclerotic and firm corneal adhesions of the membrane.

The access of light is offensive to the patient in general inflammation of the globe; the pupil contracts to exclude it, and the palpebræ are spasmodically closed. The motions of the eye and lids are interrupted or prevented; the whole external surface becomes exquisitely sensible, and as the slightest attempt at exertion occasions great pain, the patient keeps it as much as possible at rest. The surface of the organ, at the commencement of the affection, is rather stiff and dry; but this dryness goes off, and is succeeded by a copious lacrymal discharge, which is increased if the eye is exposed to the light or any external irritation. A little mucous discharge is seen about the edges of the lids and the eye-lashes.

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[*] *Treatise*, translated by BRIGGS, 2nd Ed. pp. 145 and 148. *Trattato delle principali malattie*, &c. Ed. 5. v. i. pp. 191 and 193.

Such are the circumstances which characterize inflammation of the whole globe in its first stage; as it proceeds to the second period, we begin to see various alterations of structure. The iris becomes changed in colour, loses its brilliancy, and no longer exhibits the usual motions on changes in the quantity of light to which the eye is exposed. The pupil contracts, and loses its clear black colour. The nature of these alterations will be better understood afterwards, when I come to the subject of internal inflammation. The cornea loses its transparency, becomes more or less opaque, and vision is lost. The alteration in the cornea, and in the state of the pupil, would account for imperfection or loss of sight; but, as the latter often occurs while the cornea is sufficiently clear for the transmission of light, and the pupil is still open, it must be explained by inflammatory disturbance and consequent change of structure in the retina. The patient still sees, or fancies he sees, luminous sparks and flashes of fire before his eyes, when there is no light in the chamber, or during the night, in consequence of the disturbed state of the retinal circulation.

As the inflammation continues, the globe swells, and the sense of its being too large for the bony cavity in which it is contained is not very erroneous. We cannot say positively that all the internal tunics of the eye are in a state of inflammation, because we cannot see them; but when we find that the globe is actually increased in size, that the iris is changed in structure, and that the retina has lost its sensibility, there is little reason to doubt that the internal parts of the eye generally are inflamed. The congestion within distends the globe, and causes the sense of bursting.

The internal swelling, joined to the chemotic tumefaction, occasions the globe to fill up the front of the orbit, protruding the lids, everting the inferior, and appearing externally as a red fleshy mass. Motion, which is impaired in the early stage, is now quite lost, for the swelled globe is fixed, and the upper lid is so protruded and swoln as not to be moveable by the patient's will.

The eye-lids swell from the beginning. They are at first red on the edges. The conjunctiva palpebralis becomes inflamed like that of the globe, hence the internal surface of the lids is intensely red. The integuments become red, and effusion occurs into the cellular texture of the lids generally, effacing the fold of the upper, and raising it into a convex protuberance.

In a local disease of such violence, affecting a very vascular, nervous, and highly sensible organ, situated in the immediate vicinity of the sensorium, marked constitutional sympathy may be expected, and accordingly we find inflammatory fever of a decided character from the commencement of the affection. General indisposition is felt at the very outset. The appearance of the local symptoms is preceded by a longer or shorter attack of shivering, followed by general heat of skin, thirst, pain of the head, and lassitude. When the complaint is developed, there is a quick, hard, and full pulse, dry and hot skin; a white and rather dry state of the tongue, deficiency of appetite, severe head-ache, restlessness, and generally want of sleep at night. The face is flushed, and perhaps swelled on the affected side, with a sensation of throbbing in the neighbourhood of the eye.

Effects.—If the disorder is not checked, the local pain, and the feverish state of the constitution proceed to a great height. Under such an aggravation of the local and general symptoms, the pain changes in character, it becomes throbbing, rigors are felt, and suppuration of the globe takes place; the cornea turns of a dull white and then yellow, and the globe is ultimately converted into an abscess. The occurrence of suppuration does not produce the relief usually experienced from that change, in consequence of the firm, unyielding nature of the sclerotica and cornea; the pain, together with the sense of bursting and throbbing, continues for some days, until the cornea bursts externally, and gives an exit to the matter contained in the interior of the eye. The patient then experiences relief; matter is discharged for a time; the tunics of the eye collapse into a small space, shrink into the orbit, and the original form of the organ is completely lost. The vitreous and crystalline humours of the eye generally escape when the bursting of the globe first gives an exit to the confined matter.

Such is the termination of this affection in its worst form; when it does not proceed so far, and when its progress has been checked by treatment, the cornea becomes opaque, and remains so; the pupil is either closed or very much contracted, and the aperture filled by a newly-formed adventitious substance, the consequence of effusion into the opening during the inflammatory stage, and the subsequent organization of the effused matter. In this case vision is either impaired or completely lost, but the form of the eye remains. The most favourable termination that can be expected is the recovery of the organ, with the cornea clear and the pupil open; still, in this case, the retina has generally suffered so much as to produce greater or less imperfection of vision.

Diagnosis.—The affection which I have now described may be considered as common, true, or proper inflammation, seated in the whole structure of the eye-ball; for the circumstances which I have enumerated sufficiently prove that all the component parts are inflamed. It is characterized by its commencing at one and the same time in the external and internal tunics of the eye. Internal inflammation may spread to the external coats, or external inflammation may extend inwards: but, in this affection, both sets of parts are inflamed at the same time.

This *common*, or *idiopathic* imflammation, is distinguished from the *specific*, or *sympathetic* inflammations by the following circumstances:—1st. The principal symptoms, that is, redness, pain, swelling, intolerance of light, and lacrymal discharge, are equally developed, and present a correspondence in degree. In the specific inflammations one symptom is commonly predominant over the rest. Intense external redness is seen in catarrhal ophthalmiæ often without pain or intolerance of light; in scrofulous cases, the highest intolerance, with hot and acrid lacrymation and spasm of the palpebral muscles, with hardly perceptible redness; in the arthritic and syphilitic, severe pain in the eye and its neighbourhood, with the other phenomena in a slight degree. In the forms just enumerated the swelling is inconsiderable in comparison to the particular symptoms now pointed out; but it is excessive in the purulent and gonorrhœal ophthalmiæ. 2ndly. The symptoms commence at the same time, and in an equal degree, and continue in this equal proportion to each other throughout. Each symptom also exhibits this uniformity in degree and extension. The redness occupies equally the whole surface of the organ. In catarrhal and strumous cases it is partial, consisting in distension of some fasciculi of vessels, or confined to some part of the organ. In syphilitic, rheumatic, and arthritic ophthalmiæ, the redness is in the sclerotic coat, and usually forms a zone round the cornea. The pain in ophthalmitis occupies the whole globe and orbital region, and thence extends equally to all the surrounding parts. In other ophthalmiæ it is often less in the eye itself than in the parts round the orbit. 3rdly. The course of the complaint is very regular, proceeding, when it has once begun, without intermission or remission, to its full development, unless it should be interrupted by active treatment. In the other ophthalmiæ, the complaint altogether, or particular symptoms, often undergo increase or diminution; in some, remissions, and in others complete intermissions are observed. In catarrhal cases the patient is often free from complaint during the day, the symptoms return in the evening, and are again diminished or lost in the morning. The symptoms of syphilitic ophthalmia undergo a marked diminution during the day, and show themselves again in severe nocturnal paroxysms. Scrofulous patients, on the contrary, suffer in the day, and are greatly relieved towards evening. In these cases, too, recoveries and relapses often occur suddenly, and succeed each other frequently. 4thly. True ophthalmitis is attended with considerable constitutional disturbance of inflammatory character, while the sympathetic ophthalmiæ are generally without fever, even in many instances where the inflammation runs high.

CHAPTER III.

Inflammation of the external proper Tunics; external Inflammation of the Globe.

Synonymes; *ophthalmitis externa idiopathica*, BEER. *Ophthalmia sclerotica*, or *sclerotic inflammation*, VETCH. *Catarrhal-rheumatic ophthalmia.*

THIS affection, which is common or simple inflammation in subjects otherwise healthy, varies considerably in degree, from slight congestion of the conjunctiva to acute inflammation of the same membrane with chemosis, and similar inflammation of the sclerotica and cornea. Under its various degrees and forms it has been designated by different names. The milder forms have been called *ophthalmia levis*, or *taraxis; ophalmia angularis* obviously refers to a particular seat of the disorder. *Xerophthalmia*, or *ophthalmia sicca*, denotes the dryness of the organ in the early stage of the affection; and *chemosis* is its most violent and dangerous form.

External inflammation of the eye may be seated in the conjunctiva only, or in the sclerotica and cornea; both cases being included under the vague general term ophthalmia. Although both may, without impropriety, be called external inflammation of the eye, they are very different in their symptoms, progress, termination, and treatment. In the latter instance, or that of inflammation, originating in the sclerotica, the conjunctiva is soon involved, if the affection be acute.

Simple inflammation of the conjunctiva is, generally speaking, an unimportant affection. In consequence of its loose texture, the vessels of the membrane yield readily; there is little pain or inconvenience, and no danger to the organ. I shall speak further of this under the head of *catarrhal ophthalmia.* The firmer textures of the sclerotica and cornea do not give way unless the excitement be more powerful; they yield to distension slowly and with pain; their vessels do not easily recover, so that inflammation is with more difficulty subdued; and the implication of the cornea, with the ready transition of inflammation to the iris, exposes the organ to serious danger. I have mentioned the intimate connexion between the sclerotica, cornea, and iris. We cannot in the natural state trace the actual passage of vessels carrying red blood from the sclerotica to the iris and cornea; but there must be a close vascular intercourse between them; for the iris and cornea are never inflamed without the sclerotica becoming red. On the other hand, when inflammation affects the external proper tunics of the globe, it readily passes to the iris, and thus may extend to the internal structures of the eye.

Symptoms and progress.—The symptoms of inflammation affecting the external proper tunics of the eye, are, external redness, pain, intolerance of light, increased lacrymal discharge, with more or less febrile disturbance of the constitution.

The external redness begins on the anterior part of the globe, immediately round the cornea, where it forms a red zone. If we examine the circumference of the globe, we shall find distended blood-vessels advancing from the posterior part upon the sclerotica, and branching out into numerous ramifications, which are at length lost in the red zone that surrounds the cornea. In inflammation of the conjunctiva the redness commences in the circumference, the anterior part being at first comparatively free, and the sclerotica retaining its natural white appearance. The character of the red tint differs remarkably in the two cases. The vessels distended in sclerotic inflammation are those seated immediately upon the sclerotic coat; they are therefore covered externally by the conjunctiva, and, being seen through that membrane, appear of a pink, or rose red, and sometimes almost of a violet hue, which forms a striking contrast to the bright scarlet of the vessels distended in conjunctival inflammation. The redness of the inflamed sclerotica is a rose or pink tint, being seen through the conjunctiva, and such is the colour of the red zone which surrounds the cornea in the early period of the affection. The redness is uniformly diffused through the sclerotic, as if it had been tinged by some colouring substance; thus we find that this membrane is copiously supplied with vessels, although they do not, in the natural state, circulate red blood. When the inflammation is considerable, a dense arrangement of vessels may be seen lying under the conjunctiva, and occupying the whole surface of the sclerotic coat; in short, the inflammatory affection seems to produce a kind of new vascular creation, enlarging, and thus rendering visible, a vascular plexus, of which we see nothing in the natural state of the part. In inflammation of the conjunctiva, the vessels are not only of a bright scarlet colour, but lie nakedly on the surface of the membrane. When inflammation, without being very violent, is seated in the conjunctiva and sclerotica at the same time, we may observe the marked difference in situation and tint between the two orders of vessels. They also differ in their course, those of the sclerotica running in straight lines from behind forwards, while the vessels of the conjunctiva are irregular and tortuous.

The conjunctiva soon participates in the affection; its vessels become distended and partake the inflammatory disturbance. The cornea assumes a dull appearance; it is not actually nebulous or opake, but its transparency and polish are impaired.

The patient complains of stiffness and dryness in the eye; frequently he feels a sort of burning, or aching pain; sometimes there is a sense of tension, or pressure. Often the pain and uneasiness are similar to that which would arise from the presence of sand, or gravel, in the eye. As the inflammation proceeds, the pain increases, and extends to the back of the orbit, and more or less to the corresponding side of the head. Intolerance of light is a marked symptom from the commencement of inflammation in the sclerotica; the pupil contracts in order to exclude the light, and the patient carefully avoids all exposure to it. Here is another striking contrast between this affection and conjunctival inflammation; for in the latter the patient generally opens the eye freely, and experiences no pain from the access of light. We naturally enquire what cause can be assigned for this striking difference in the phenomena attending inflammation of two textures so contiguous to each other. Considerable inflammation may exist in the mucous membrane of the eye, without any affection of the globe; thus the disturbance does not approach the retina. But inflammation of the sclerotica and cornea requires for its production a more serious exciting cause; and this disturbance, being seated in the globe itself, must affect, more or less, the internal tunics generally, and the retina in particular. Hence the intolerance of light accompanying inflammation of the sclerotica and cornea, which is often observed where the transparency of the latter is impaired; a circumstance which, if the internal tunics were unaffected, might, *a priori*, be supposed calculated to lessen the impression of light on the organ. This intolerance, even when excessive, is a strictly functional disturbance; it does not depend on disease of the retina, or lead to any suspicion of internal inflammation.

The redness in the conjunctiva increases, the vessels become more and more distended, at length the membrane acquires a general bright red colour, and in violent cases goes into the state of chemosis; at the same time the cornea loses altogether its bright polished appearance, becomes dull, like dirty glass, and turns of a greyish hue. These changes are generally accompanied with increase of pain and fever, with extension of redness and swelling to the lids, and such augmentation of pain on motion, that the part is kept quite still. At the commencement of this affection the eye feels dry and stiff, (*xerophthalmia o. sicca,*) there is an interruption of the ordinary secretion, but this is soon re-established, and an increased lacrymal discharge takes place, so that whenever the patient opens the eye to the light there is a copious flow of hot, scalding tears, from the sympathetic influence of the inflammatory excitement on the lacrymal gland.

Effects.—If the inflammation proceeds, serious changes of structure take place in the anterior part of the organ. The cornea, which in violent inflammation of the sclerotica is generally involved in the affection, is the part which principally suffers. It first becomes greyish, and when the conjunctiva swells and passes into the state of chemosis, it turns white, cloudy and then yellow, as if pus were deposited in its texture. In fact, we may say that the cornea has suppurated; the only objection to such an expression being that the matter thus deposited, though yellow like pus, is not fluid, but of a thick consistence, and viscid. If we puncture the part, matter does not escape; it does not make its way to the surface, point and discharge, like the contents of an abscess; but the cornea ulcerates; the newly deposited yellow substance is exposed, and gradually removed by ulceration. A similar process seems to occur internally, at least a secretion sometimes takes place into the anterior chamber, and a yellowish substance falls down to the bottom of it, producing the phenomenon of hypopyon. When the cornea suppurates generally, ulceration commonly extends into the anterior chamber at several points; the aqueus humor escapes, the iris comes in contact with the inflamed and ulcerated cornea, and is often protruded at one or more points. When the inflammation subsides, the cornea is opaque, the iris adherent to it, and the anterior chamber abolished; in short, the eye, so far as the purposes of vision are concerned, is lost. Sometimes matter is only deposited in one point of the cornea; there is a yellowish appearance at this spot, and a general nebulous whiteness pervades the rest of the structure. In this case, if the ulcerative process has taken place, its further progress may be checked, and the ulcer may heal: or, by active treatment, ulceration may be altogether prevented; the matter will be absorbed, the cornea nearly regain its natural appearance, and vision be restored entirely, or with little defect.

It has been commonly represented that when the cornea suppurates, the effused matter insinuates itself between the laminæ, finds its way to the bottom, and, accumulating at the lower edge, produces there an appearance which has been called *onyx* or *unguis*, from its resemblance to the mark at the root of the nails. I believe that the cornea is too dense to admit of this mechanical sinking of the matter, and cannot say that I ever saw onyx in this sense. I believe that the matter remains in any part of the cornea, in which it may have been deposited.

By the inflammation, which produces suppuration of the cornea, its texture is softened; thus it is found flabby, and does not resist the knife when an attempt is made to puncture it after ulceration has taken place externally, or after the escape of matter into the anterior chamber.

A less degree of inflammation, accompanied with interstitial deposition, may produce partial or general loss of transparency.

The cornea is prone to ulceration, and a breach of its surface produced by this process frequently accompanies external ophthalmia. The ulceration is at first superficial; the ulcer goes deeper and deeper into the corneal laminæ, at last penetrates the anterior chamber, letting out the aqueus humor, and leading to *prolapsus iridis*. Penetration of the anterior chamber is not necessarily followed by the latter occurrence; a portion of the iris may fall against the opening, and seem adherent for a time to the cornea; but, if the opening be small, the iris may be detached on the healing of the ulcer. In general, however, when the anterior chamber is penetrated, prolapsus iridis takes place. The prolapsed portion becomes permanently adherent to the cornea: when the eye has recovered, we see a dark speck in the cornea, surrounded by a white margin. The black or brown point is the portion of iris which has plugged the breach of the cornea, and its opaque edge is the cicatrix of the corneal ulceration.

Adhesion of the iris to the cornea, which is technically called *synechia anterior* may take place without prolapsus. It occurs when the cornea is violently inflamed, as in suppuration, interstitial deposition extending through its whole thickness, or extensive ulceration.

The vessels of the cornea may become so enlarged under inflammatory excitement, as to admit red blood, and to make the part appear more or less generally vascular. These vessels are branches of the deep-seated trunks lying on the sclerotic coat; they form a dense arrangement of extremely minute ramifications, advancing from the sclerotic upon the cornea, and are of a reddish-brown tint.

Sometimes the cornea is only rendered a little dull, and no essential change of structure takes place. In less violent attacks, or under proper treatment in the beginning, its transparency is never impaired at all, and the organ quickly regains its natural appearance and powers.

Diagnosis.—Inflammation of the external proper tunics is distinguished from that of the conjunctiva by the redness being originally seated in the sclerotica, by the discharge being lacrymal and not mucous, by the pain and intolerance of light, and by the changes occurring in the cornea. In the other affection, there is increased mucous discharge, little or no pain, nor intolerance of light, except at first, and seldom any affection of the cornea. From internal ophthalmia it is distinguished by the natural state of the iris and pupil, and the unimpaired vision.

Prognosis.—The degree of danger to the eye will depend on the question whether the inflammation extends to the cornea, and if it does, on the degree of that inflammation. If the cornea is not involved, there is no risk; or if the affection of that part be slight, we need not apprehend any injury of vision. The degree of sclerotic redness in the early stage is a criterion from which we may form an opinion whether it will be severe or otherwise. If the case proceeds to the length of chemosis, if the cornea becomes grey or white, or if matter be deposited in its texture, sight will be more or less impaired. If there is only a deposition of matter at one point, the case is serious; for this cannot occur without violent inflammatory excitement, and it is attended with nebulous opacity of the whole structure. The effect of opacity or ulceration of the cornea on the subsequent exercise of vision will depend on their position with respect to the pupil. A dense opacity may be uninjurious, if it does not interfere with the pupil; and a very inconsiderable one, situated in the centre of the cornea, may seriously impair sight.

CHAPTER IV.

Causes of Ophthalmic Inflammation.

In investigating the origin of disease, inquirers could not fail to distinguish, from the earliest times, those circumstances which produce a state of body favourable to the occurrence of disease, from such as immediately precede and directly excite the morbid phenomena. Hence in medical works causes of disease have been always divided into two classes, the *remote* or *predisposing*, and the *immediate* or *exciting*.

The organization of the body is in relation to the influences which surround it, and these do not affect it while in a healthy state; but the least of them is capable of producing disease, when the body is prepared for their action by certain previous changes, which, although produced almost insensibly, are of great importance, as constituting the first links in the chain of morbid phenomena, the first steps in the transition from health to disease. A person in sound health encounters wind and weather, not only without harm but with benefit; he is not injured by atmospherical vicissitudes, by cold, heat, rain, draughts of air; while a little damp or a puff of easterly wind will bring on serious disease in sickly persons. The necessity of closely investigating these predisposing agencies in reference to the important object of preserving or restoring health, and thus preventing disease, is too obvious to require further explanation.

As the eyes are parts of a general organic system, connected with the rest by vessels and supply of blood, by nerves, and by reciprocal sympathetic influence in health and disease, the remote or predisposing causes must be the same for them, as for the rest of the body, and some of the immediate causes are at all events analogous. I shall first consider the latter, as their agency is the most obvious.

Immediate or exciting causes.—In the first place, inflammation of the eye may be produced by direct injury, such as accidental wounds, or intentional violence inflicted in surgical operations. Such causes always excite inflammation, which will vary in degree according to other concomitant circumstances. This liability to inflammation, after surgical operations, requires our serious consideration in the previous preparation and subsequent management of the patient. Direct injury to the organ may be produced by various extraneous substances coming in contact with it, or, in popular language, getting into the eye. Minute bodies of all kinds may pass between the lids, and remaining fixed either to them, or to some part of the external surface of the globe, become a source of irritation and inflammation. Some of these may irritate the organ mechanically, as particles of dust, sand, or stone; some may act chemically, such as various acrid substances, particles of snuff, pepper, salt, acrid fumes, and different chemical substances; others may affect the organ both mechanically and chemically, as portions of heated metal. Under the head of chemical stimuli, or irritants, it would not be proper to omit the mention of numerous matters applied to the eye under the name of remedies. It would seem as if the most delicate and sensible organ of the body had been selected for trying the most violent applications. Powdered glass and sugar, wine and tincture of opium, electricity and galvanism, spirituous and ammoniacal vapours, are the mildest of the ordinary local stimuli. Subacetate of lead, white and red precipitate, nitrate of mercury, oxide of zinc, alum, the sulphates of zinc and copper, nitrate of silver, and oxymuriate of mercury, are applied daily to the eye, in the form of solution, and various other shapes. The more active escharotics are sometimes resorted to, as the nitrate of silver in substance, and we read even of the kali purum having been used. Pretty strong and almost concentrated nitric and muriatic acid, and the muriate of antimony, have been occasionally employed. The circumstance of these substances being called remedies, does not alter the nature of their action on the organ. A small portion of any of them applied to the sound eye of a healthy person would produce a greater or less degree of inflammation, and there can be no reasonable doubt, that in many instances of their application to the organ, when already inflamed, they aggravate or keep up the disease which they are employed to lessen or remove.

Ophthalmic inflammation may be directly excited by the application of certain contagious substances, for example, gonorrhœal discharge from the urethra, and the puriform discharge of purulent ophthalmia.

The eyes are meant to be used, and although so delicately organized, are capable of great daily exercise for a long course of years. But there are limits to their power of endurance. Excessive exertion on minute and very bright objects, as in microscopic and telescopic pursuits, is sometimes suddenly injurious. They suffer again from habitual daily employment for many hours, continued often by candlelight, in occupations requiring close attention, as in weavers, tailors, shoemakers, milliners, mantua-makers, sempstresses, printers, engravers, painters, draftsmen, law-stationers, clerks in counting-houses, watch makers, instrument makers, working jewellers, and all persons engaged in the various manual crafts; in students and literary persons, especially when they read much small print, or write in small characters. In speaking of use of the eye, we must however distinguish between active and passive vision: the impressions of light on the retina are constant during our waking hours; but this merely passive sight is uninjurious. The unnatural excitement of the organ is combined, in many of the previously enumerated instances, with want of exercise, full diet, use of spirituous and other strong liquors, and consequent derangement in the functions of the digestive organs. The injurious influence of over exertion is shown by the relapses of inflammation caused by returning to such occupations before the organ has completely recovered.

Air and light, the elements for which the eye is created, can hardly ever be injurious to the sound organ of a person in good health; yet, under some circumstances, they are capable of exciting disease. I shall speak more particularly of various atmospherical influences, in considering catarrhal ophthalmia, and merely observe at present that the dense winter fogs of London will cause smarting and soreness of sound eyes in healthy individuals. The effects of bad air, or noxious effluvia, will be adverted to under the head of purulent ophthalmia; but it may be stated here, without attempting to explain how it occurs, that the air of hospitals, work-houses, close rooms in confined situations, is injurious to the eyes, favours the continuance of inflammation, and retards recovery from operations. Complaints which have been lingering on in spite of every effort at cure, in such situations, get well of themselves when the patients are removed into good air. The improvement is often so rapid, that we seem obliged to admit a direct noxious effect of unwholesome air upon the organs, in addition to the well known injurious influence upon the system at large.

Exposure to light may be hurtful, either by the sudden impression of powerfully luminous objects, as a flash of lightning, or looking at the sun in eclipses, or by the longer use of the organ under less intense light, as that of lamps, or gas-lights, or by its employment upon bright metals, or other shining objects. The injurious effects are aggravated, if the exposure to light be accompanied with heat, as in the case of cooks, bakers, workers in glass-houses, iron foundries, &c., or with the excitement of considerable bodily exertion, as in soldiers making long marches under a powerful sun.

Some forms of light irritate the eye more than others; thus, reflected, is more powerful than an equal quantity of direct light. The glare from the sea, or extensive sandy surfaces, particularly in warmer climates than our own, is extremely offensive to the eye. Even in this country, where we are not much troubled with the brightness of sunshine, the white roads in chalky soils are sometimes found very trying to the eyes; and the bright white or yellow of houses and walls in some towns distinguished by particular cleanliness and neatness, has been found offensive in the same way.

Exposure to light is particularly offensive to individuals labouring under inflammation of the external tunics of the eye-ball. This affection is prevalent among the Esquimaux, and the inhabitants of other high northern latitudes, and is so obviously caused by the powerful reflection of light from the snow, which covers the earth for many months in the year, that it is commonly called *snow blindness*. Some of their contrivances for protecting the organ from this source of irritation are extremely ingenious.

In the affection of the eyes caused by exposure to the glare from snow, there is intolerance of light, with profuse lacrymation, and an uneasy sensation, as if a particle of sand were in the eye, which is aggravated, as the disease advances, to the severe suffering which might be supposed to be produced if snuff were thrown into it. Violent spasm of the eye-lids occurs. The symptoms seldom go off in less than ten days, and often last four weeks. The Tartars protect themselves when they hunt or travel in the winter, by a contrivance analogous to our crape spectacles; that is, by a net-work of black horsehair, made a little convex in front, so that it may not interfere with the motion of the lids. The *snow-eyes* of the Esquimaux, as they are called by travellers, are a kind of goggles, made of extremely light wood, resting by a bridge on the nose like spectacles. It is excavated on each side, so as to allow free motion of the lids. The excavations are stained black with soot. A long narrow slit is made in the wood opposite each eye, corresponding exactly to the fissure between the lids, when they are nearly closed in looking at an object under a strong light. BLUMENBACH, who has decribed and figured these Esquimaux spectacles, says, "I was unfortunate enough lately, having been affected for several months with tonic spasm of the eye-lids, to have repeated occasion to make use of this excellent and simple contrivance. Whenever I wanted to examine anatomical preparations, or objects of natural history in a clear light, no other assistance answered my purpose so well as the snow-eyes of these rude people. It also serves for a telescope, as all the visitors of my museum who have tried it can testify; and we find that the Esquimaux use it for the purpose of discerning distant objects more distinctly, when they are not troubled by the reflected glare from the snow."*

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* BLUMENBACH, *specimen historiæ naturalis*, &c. Goetting. 1816, 4to.

Particular colours, and combinations of colour, are found to be painful to the eyes; thus it is well known that red is offensive, and green agreeable to them. Variegated surfaces, presenting a variety of colours, are sometimes annoying; thus persons who are obliged to look much at patterns of articles in linen and calico, often complain of their painful effect on the eye.

The causes above enumerated admit of being divided into two classes. Some of them, such as external injuries, chemical substances, or morbid animal poisons, will necessarily produce more or less inflammation: one case may be serious, another slight. If we extract a cataract from an individual in good health, and whom we have carefully prepared for the operation, hardly any perceptible inflammation occurs; but, if we operate on a person of gross habit, without the requisite preliminary cautions, such inflammation may ensue, as entirely to frustrate the object of the proceeding. The other agencies, such as the application of cold and moisture, and excessive exertion of the organ, do not produce inflammation invariably. Many persons may be exposed to cold, wind, rain, or snow, and most of them will suffer no injurious consequences, but one may be attacked with sore throat, another with catarrh, a third with inflammation of the eye. Out of a large party sitting down to a feast and indulging equally, one individual will have an attack of apoplexy. A person in good health receives a slight blow on the foot, or a twist of the ankle, and experiences a merely temporary inconvenience; while in a person of full habit the same causes will bring on an attack of the gout. To produce disease, therefore, it is necessary, not only that an exciting cause should be applied to the eye, but that either the part, or the individual, or both, should be in a state susceptible of the action of that cause. The same exposure or employment of the organ which would produce no inflammation in the sound eye of a healthy person, will, under certain conditions of constitution, excite inflammation. We must, therefore, inquire into those predisposing circumstances, which, though they do not immediately affect the organ, render the body susceptible of disease. In investigating these causes, we find the evidence much less clear than in the other cases. Those alterations in the constitution, which bring individuals from perfect health into a state susceptible of disease, are produced in a length of years, and by the continued application of influences, which do not act immediately or visibly at any one time. We cannot trace their direct influence, as we cannot see the hour-hand of a watch move; but we judge of it by the effects which are sensible after a considerable lapse of time.

Remote or predisposing causes.—Among the predisposing causes of disease, the following are the principal. First, natural peculiarities of organization, either such as are common to many persons, and called *temperaments*, or those, which being confined to the individual, are called *idiosyncrasies.* The law of nature, by which the progeny resembles the parents, extends to these diversities. Thus temperaments and idiosyncrasies, and consequent disposition to certain diseases, run in families, like particular forms of the features.

Here the question naturally occurs, whether light or dark eyes are the most susceptible of disease. It has often been supposed that the former are the most prone; but this is doubtful. Dr. SMITH, an army surgeon, found that of 176 diseased eyes, 116 were light, and 60 dark, which is about two to one. But in 2,163 sound eyes, there were 1,500 light, and 663 dark, which is nearly five to two.*

2dly. Morbid dispositions, such as scrofula, gout, and rheumatism. These, in some persons, depend merely on the original nature of the constitution derived from the parents; but, in others, they consist in certain states of the frame, which may be produced by external agents, in individuals who are supposed to be born healthy. Morbid dispositions, therefore, or as they are sometimes called, diatheses, are either hereditary or acquired.

3rdly. Age and sex, climate and situation, often have a marked influence in favouring the occurrence of disease, and impressing on it a peculiar form. The influence of the latter is exemplified in the frequent occurrence and severity of erysipelas and hepatic inflammation in hot countries, and in the numerous and serious inflammations of the eye in Egypt and other similar situations.

4thly. I have mentioned excessive exertion of the eye among the circumstances capable of immediately exciting disease. When it is habitual, it is a powerful predisposing cause, by keeping up an unnatural excitement of the organ, and thus it often lays the foundation of chronic internal inflammation, especially where the digestive organs and vascular system are constantly stimulated by imprudent habits of diet, and the free use of fermented liquors. In the year 1830, I was consulted within the same week by two naturally healthy young men from the country, who had followed the occupation of wool-sorting, which is very trying to the eyes, and in both of whom slow inflammation of the retina had occurred, with loss of vision in one instance, and serious injury of sight in the other. One of them, thirty years of age, used to work twelve hours a day in summer, eight in winter. He ate animal food three times a day, drank three pints of ale daily, and spirits occasionally. In his right eye there was a little external redness and slight haziness of the cornea, dilated and motionless pupil. Vision was nearly extinct; he could just discern my hand when held towards the light, but he could not distinguish whether the fingers were open or shut. By cupping, purging, reduced diet, and the use of mercury, he recovered in a month, so as to be able to read the leading article of a newspaper.

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* *Edinburgh Medical and Surgical Journal*, No. 68, p. 351.

The other, a very stout man, with large head and full face, was about forty. He had always lived well, but, as he stated, not intemperately. He had lost the sight of his right eye three or four years: there were two adhesions of the pupil and no other appearance of disease. Two similar adhesions were found in the left eye, of which the sight had recently become dim and imperfect.

5thly. Unhealthy states of constitution, however produced. Perhaps the most powerful and general of the remote causes of inflammation, whether we consider the *accidental* form of the disease, arising from the immediate application of the agencies already enumerated, or the *spontaneous cases* which are said in common language to come of themselves, the causes escaping our observation, is fulness of habit, or, technically, general plethora. Many persons introduce into the system a much greater quantity of food than the wants of the economy require; they sin both in amount and quality, especially in the two articles of animal food and fermented liquors. This excessive nutrition is attended, in the first instance, with a more vigorous exertion of the various organs; there is an apparent increase of health and strength, the person looks florid and robust, and seems to be in high health. Sooner or later a condition of body results, bordering on disease. There is a full and strong pulse, a disposition to heat of skin, thirst and head-ache; or these are produced by slight exertions. The tongue is whitish. The state, in short, is closely allied to disease, although it is still called health; it is a condition in which disease will easily be induced, and in which, when it occurs, it assumes the active inflammatory character. It is pure, simple, or common inflammation which occurs under such circumstances; that is, inflammation arising from the excess of nutrition in an individual otherwise healthy.

It has been questioned whether the quantity of blood is increased in these cases, that is, whether the expression *plethora*, or *fulness*, is literally applicable to the state of the vascular system. It is difficult to determine the point. We do not know the regular or normal quantity of blood, and we cannot ascertain the quantity which the vessels of an individual contain at a given time; thus we want both terms of comparison. Under the circumstances described, we often find an unnatural fulness and strength of pulse; and the blood drawn from such persons frequently presents the inflammatory character. They are in a state very similar to that of females, in whom the catamenia have been suspended, where we see flushing of the countenance, pain of the head, and determination of blood to some part. The same circumstances are observed in persons, in whom large old ulcers have been rapidly healed. I am inclined to believe that there is an unnatural quantity of blood in such cases, and that the expression of plethora is literally correct.

Individuals are not aware of the effects of the habits in which they indulge, until at length symptoms of derangement and disease manifest themselves in various parts of the animal economy. The subject will be best understood by adverting to cases, in which such practices have been carried to a great degree. We have the opportunity in London of making such observations on an extensive scale. A large proportion of the individuals, who follow certain laborious occupations, obtain high wages, which they spend chiefly in direct sensual gratification of the grossest kind. It is no uncommon circumstance for men employed in the coal business, brewers' servants, draymen, porters, and others, who are, generally speaking, fine robust men from the country, to consume from four to twelve pots of porter a day, besides gin, and a full allowance of animal food. We certainly see many of these who, if we regard fulness of flesh and ruddiness of complexion as signs of health, may be considered as fine specimens. But these persons are subject to inflammatory attacks of the most violent kind, which they bear very ill. Slight injuries, which, in others, would be wholly unimportant, produce in them severe inflammation often terminating in gangrene and death. I have seen the whole lower extremity mortified up to the groin, in thirty-six hours, from a simple scratch of the shin, in a drayman. They live, in fact, on the brink of disease; the slightest accident very commonly carries them off, and if they escape casualties, the continuance of their intemperate habits leads to inflammation of some of the thoracic or abdominal viscera, which either proves fatal in its active stage, or, by causing dropsy, leads more slowly, but with equal certainty, to dissolution. The majority do not survive the age of fifty; hundreds of them die in our hospitals from disease in the viscera, and afford us ample opportunities of investigating the changes consequent on inflammation, and of demonstrating, in its fatal termination, the effects of such a mode of life. In the natives of India we may contemplate the effects resulting from opposite habits. The religious notions of the Hindoos induce them to abstain from animal food, and they live almost entirely on rice and other vegetables. They are small in stature, slender limbed, and very well formed; the symmetry of their figures not being impaired by any superfluous fat; yet, in active exertion, fine, well-fed Englishmen are quite unable to compete with these slender Indians, who greatly surpass us in all feats of activity, such as running or walking great distances, &c. Accidents or operations, which, in full-fed Europeans would be attended with dangerous inflammatory excitement, produce very trivial effects on the natives of Hindostan. Severe injuries cause very little febrile disturbance, and they recover commonly under circumstances which would be considered desperate in individuals of different habits.

Although robust constitution, fulness of habit, and youth, predispose powerfully to acute inflammation, whether of the eye or other parts, they are not essential conditions to the production of such disease, which often arises in weakened states of body, and sometimes where the debility is great. Strength, instead of favouring the occurrence of inflammation, resists its development most effectually. I mean by strength, the healthy condition of the frame, in which all the functions are carried on perfectly, and in which there is the greatest power of regular and continued bodily and mental exertion. Such are not the attributes of plethora, in which the appearances of strength are fallacious, and accidental inflammations are easily produced. The numerous class of spontaneous inflammations, however, occurs in subjects of unhealthy or impaired constitutions; often in those who may be considered naturally weak, as the scrofulous, and sometimes where extreme debility has been produced by disease, as in typhus fever. "I have often," says P. F. WALTHER,* "seen acute ophthalmitis, requiring the most powerful antiphlogistic treatment, in weak, badly organised subjects. Lately I had occasion to treat such an affection in a person recovering from typhus, which had left him so weak that he could not stand without support. He refused to submit to my recommendation of venesection; and, in the course of seven days, the disease advanced so considerably, that the pupil of the right eye was nearly closed, and the left eye had become attacked by very active and painful inflammation. He was bled on the eighth day, and again on the ninth, when leeches were also applied. The abstractions of blood gave sudden and permanent relief, both in regard to the pain and state of vision; but the latter remained imperfect in the right eye in consequence of a thin adventitious production in the pupil."

Habitual excess, particularly in the use of fermented liquors, not only produces general fulness and excitement, but more especially affects the head, causing increased activity of circulation, in which the eyes participate. A single hearty meal will cause visible vascular fulness, redness, heat, flushing of the face, beating and throbbing of the head; these phenomena being followed by head-ache, drowsiness, and more or less incapacity for mental exertion. Can we suppose that the daily repetition of these causes will fail to produce ultimately the most serious consequences? The mischief is aggravated when the return of blood from the head suffers any impediment. In this way tight neckerchiefs and the stiff stocks of the military have been prejudicial.

The suppression of habitual discharges will obviously favour the occurrence of general plethora; thus ophthalmic disease, as well as other local affections, often owes its origin to the interruption, or the cessation of menstruation, sometimes to its non-occurrence at the usual period.

If the causes, which have originally produced plethora, continue to operate; that is, if into the system, which is already overloaded, excessive and unwholesome supplies are continually introduced, the functions of the organs begin to be disturbed; they are unable to dispose of what is thus poured in upon them. Digestion is first deranged; the associated and subsequent processes of chylification, absorption, fecal and urinary excretion are necessarily perverted. The secretions of the alimentary canal, and of its subsidiary organs, particularly the liver, become vitiated, the contractions are impaired, and thus the regular course of its functions is interrupted. The digestive organs perform the important office of preparing the supply of new materials for the growth and repair of the body; they also remove from the system the residue of the alimentary matter, after the nutriment has been extracted from it. If healthy supplies of new matter are introduced into the frame, all the animal actions, whether bodily or mental, are carried on with vigour; the body is active, the mind is alert; and a general feeling of health pervades the whole frame. But if the nutritive system is disturbed, if the alimentary canal is loaded with undigested matters and unhealthy secretions, then materials of disease rather than of health are distributed over the body; under such circumstances, any organ may become diseased, any mental function deranged. The unhealthy condition of the constitution is now evinced by changes too obvious to escape observation; the characters of plethora are succeeded by a state of defective excretion. There is a foul tongue, deficient, or sometimes unnaturally voracious appetite; costiveness, the motions, when procured, being unnatural in colour and consistence. The urine is deficient in quantity, high-coloured, and turbid; the skin is sallow, harsh, and dry.

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* *Abhandlungen*, p. 397-8.

Although the most common cause of this condition is excessive nutrition, or errors in diet, it may occur independently of these, without intemperance, even without imprudence in diet. It may take place in consequence of circumstances which act immediately on the nervous system, and which affect the digestive organs secondarily. Among the causes which are referrable to this head may be mentioned indolent habits, sedentary occupations making people neglect the advantages of air and exercise, which are as necessary to health as food is to existence, residence in the impure air of confined and crowded dwellings, excessive mental exertion, long continued anxiety and affliction. Such causes impair the energy of the nervous system, rendering it weak and irritable; this again disturbs the functions of the digestive organs, producing indigestion, costiveness, and all their attendant train of evils. The concurrence of such circumstances aggravates the bad effects of imprudence in diet. When we consider that, in a large portion of the community, the predisposing causes, which have been now explained, are united with the direct exciting influence of excessive exertion of the organ, we shall cease to wonder at the numerous instances of inflammation in all the textures of the eye, that daily present themselves to our observation.

From these considerations it is obvious, that in many cases we ought to direct our attention, not so much to the organ which is the immediate seat of disease, as to the influence of certain circumstances and habits on the constitution. At all events, if, under the immediate urgency of active disease, the state of the suffering part should require our first care, the prevention of future disorder cannot be accomplished without such an investigation as I have just pointed out.

In the various cases which I have now considered, we see the effect of some direct agency on the disordered part, either such as necessarily excites inflammation in some degree, or such as will cause it in individuals who are predisposed. There are other and numerous cases, in which we can trace no direct application to the inflamed part; but we discover the existence of disturbance in other quarters, and we find that the removal of those disturbances in many cases either accomplishes, or essentially assists the cure of the inflammation. The former are called *idiopathic*, the latter *sympathetic* inflammations. The conjunctiva may be inflamed by the application of gonorrhœal matter, or gonorrhœal ophthalmia may come on, without any such direct cause, merely in consequence of the previous disease of the urethra. The iris inflames from injury, or it may suffer from infection of the constitution by venereal disease. Inflammation of the testicle in gonorrhœa is a sympathetic affection.

The cases to which I have cursorily alluded, under the head of spontaneous inflammations, belong to the sympathetic class. It is difficult to determine whether their occurrence is owing to the unhealthy states of constitution already described, or to the influence of disturbance in some particular organ; whether they take place through the medium of the vascular or of the nervous system. That the former has an important share in the affair in many instances, cannot, I think, be doubted. Under the constitutional disturbance which follows serious local injury, such as compound fracture or other extensive wound, laceration, or bruise, inflammation may arise in various important organs, as in the peritoneum, pleura, or pericardium, in the lungs, heart, liver, or spleen, as well as in the joints, and the muscular system. If the active disorder excited in the constitution in this way can produce such local effects, we may easily suppose that the less violent disturbance, which constitutes plethora, may be capable of producing the various local inflammations, the ulcerations, thickenings, indurations, enlargements, which are said in common language to originate spontaneously, or of themselves, and which have so much puzzled nosologists in the attempt to account for their causes and mode of production.

CHAPTER V.

Treatment of Ophthalmic Inflammation. Chronic Ophthalmia.

SECTION I.—PROCEEDINGS IN THE CASE OF FOREIGN BODIES IN THE EYE.

It is a trite maxim in the treatment of disease to commence by removing the cause; and the propriety of this course is particularly obvious where that cause is mechanical, as in the case of extraneous substances getting into the eye. They irritate the organ and produce an increased lacrymal discharge, which is sometimes sufficient to remedy the mischief, as in the case of substances in fine powder, or of acrid matters, such as snuff, pepper, salt, &c. Chemical agents are generally found to have produced their full effect before we see the patient. A particle of nitrate of silver destroys the surface it touches, but it is so quickly decomposed by the moisture of the organ that its caustic action is not deep. I have seen acute external inflammation, requiring active antiphlogistic treatment, from a small particle flying into the eye, as a person was scraping a stick of lunar caustic to a point.

Lime, in a pure state, applied to the cornea, turns it of a dead white, and at the same time decomposes the texture, reducing it to a powder, which may be brushed off by a camel-hair pencil. The effect of mortar, which gets into the eye more frequently than lime, is less injurious in degree; it turns the cornea white, but does not decompose it. Lime and mortar destroy the surface of the conjunctiva, giving it a soft, pulpy, coagulated appearance; the portion deprived of vitality is of a dead white, and as the effect is usually partial, the membrane appears marbled.[*] Any particles of these matters should be immediately removed, and if it should seem probable that the caustic action of the lime is not at an end, vinegar and water may be applied to the eye.

The cornea loses its vitality throughout, when pure lime is freely applied to it; hence vision is generally lost, as the whole cornea, or the greatest part of it, suffers in most cases. When the injury is superficial, the dead part slowly separates, and the transparency of the texture is partially restored. In the case mentioned by MR. WARDROP,[†] two-thirds of the cornea were rendered so obscure by the application of lime, as entirely to destroy sight. At the end of five months "the whole of the slough had separated, except some small ragged portions towards the centre of the cornea. There was a degree of obscurity, apparently seated deep in the cornea; but the patient's sight was so much recovered, that with this eye he could distinguish large objects."

A detached eye-lash under the upper or lower lid produces an annoying uneasiness. To remove it from the former situation, eversion of the lid is necessary.

The most common cases requiring our assistance are those in which minute particles of dust and other matters are blown into the eye, and either lodge on the external surface of the globe, or stick in the mucous lining of the palpebræ. In either case the organ experiences considerable irritation, for whenever the globe or lids are moved the foreign substance scratches the opposed sensible surface, and causes acute pain; so long as the eye is at rest, the patient does not suffer. In order to discover and remove any minute substance of this kind, we must first look attentively at the exposed surface of the organ in a good light; if we discover nothing there, we should proceed to depress the under lid, and bring the lower surface of the globe into view by desiring the patient to look up to the ceiling. If we still find nothing, we must direct the patient to look in the opposite direction, and raise the upper lid, so as to bring into view the superior surface of the globe. In most instances these substances stick in the concavity of the upper lid, and cause exquisite pain by scratching the very sensible surface of the cornea, whenever the lid is moved; the suffering is much greater than when the substance adheres to the cornea, since the mucous membrane of the lid, which is the suffering part in the latter instance, is not so acutely sensitive as the surface of the cornea. In order to discover and remove them, when thus situated, we must evert the lid, which is very easily accomplished. We take the cilia between the finger and thumb and draw the lid downwards and forwards; press with a probe steadily against its upper part; then carry the ciliary margin upwards and backwards: we thus turn the lid inside out, and immediately see whether any extraneous body lodges there. This is a simple and perfectly easy mode of examining the lid under various circumstances; it can generally be accomplished without giving pain. When we let go, the lid returns of itself; if it should not, we immediately replace it by drawing the ciliary margin downwards.

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[*] MR. WARDROP has delineated very faithfully the effect of lime on the cornea and conjunctiva, in his *Essays on the Morbid Anatomy of the Eye*, vol. i. pl. 5. fig. 3.

[†] *Ibid.* p. 161, 162.

The small metallic particles, particularly of iron, which get into the eye in striking a light, in the operations of smiths, cutlers, and other workers in metals, either stick close to the surface, or are imbedded in the substance of the cornea, presenting the appearance of a small shining black or dark brown point, which cannot be detached with a probe, and is often so small that it might escape notice unless the eye were minutely examined. These particles do not penetrate the cornea by the direct force of the motion; they are ignited and appear as sparks; consequently they burn where they touch, and stick close to the burnt part. We must remove them with the point of a cataract needle. Let the patient sit down opposite a window; then standing behind him, we separate the lids with the fingers of one hand, while we use the needle with the other. When we have a clear view of the particle, we direct the patient to look steadily at one object, so as to fix the eye in that exact position, then bring the point of the needle to the edge of the substance, and passing it under, lift the foreign body out. Sometimes we succeed better with the patient standing, placing ourselves in front. Particles of steel or iron leave a light brown stain on the cornea, which disappears in a day or two. The proceeding enjoined by **Beer**, of scraping off the stained part with the cataract needle, is quite unnecessary; and fortunately so for the patient, as it could not be executed without a greater injury to the eye than that of the original accident. He seems to contemplate the employment of considerable force, as he adds a caution against penetrating the cornea with the instrument!! When such substances are deeply sunk in the cornea, it is no easy matter to detach them, and the difficulty is increased by irritability of the eye, which is turned away involuntarily when the patient sees an instrument approach. More injury may be produced by persevering in our attempts than by suffering the substance to remain. If it is left, ulceration will take place, loosening, and ultimately detaching it. This event is accelerated by the oxydation which the metal undergoes, in consequence of which its texture is loosened, and it is partially converted into a powder of a rusty colour.

Sometimes foreign substances, particularly if small and smooth on their exposed surface, stick in the cornea for many days, even for weeks or months, without exciting inflammation, or causing much uneasiness. In other instances they bring on inflammation very quickly; ulceration soon occurs, and the irritant is thus removed.

Sometimes foreign bodies of some size get entangled in the loose folds which connect the conjunctiva to the globe, and remain there for a considerable time. I recollect removing a bit of twig, from the bough of a tree, which had lodged in this situation, and remained there for several weeks. The patient was not aware of the existence of any foreign substance in the eye. Swelling of the conjunctiva and something like a fungous growth from the membrane have sometimes occurred from such causes. A gentleman consulted me on account of uneasiness in the eye; he stated that he had been on a journey three or four weeks before, and that in travelling on the road a small insect flew into his eye; he was not, however, disposed to attribute his present suffering to that circumstance. On everting the lower lid, I found the wing cover of a minute species of beetle, lying on its inner surface. After this had been removed, he said he still felt something in the upper lid, and upon everting that also, I found the other wing cover of the same insect. We should therefore examine very carefully in all doubtful cases, extending our investigation to the reflexions of the conjunctiva from the lids to the globe.

The directions given in books respecting extraneous substances in the eye are in general of little use. BEER is tediously minute in describing every variety of matter by which the eye can be injured, and in laying down rules of treatment; but he does not even mention the simple proceeding of everting the upper eye-lid, which enables us to give the necessary relief in the great majority of cases. Injections of water, milk and water, and mucilaginous fluids under the lids, and over the surface of the eye, are recommended; these are of no use, and indeed can only add to the irritation which already exists. If any injection could remove the foreign body, the flow of tears which its presence excites would be sufficient; when it sticks to the concavity of the upper lid, injections are wholly ineffective.

Many other proceedings advised by **BEER**, such as the use of variously-shaped forceps and spatulæ, and the introduction under the lids of camel-hair pencils dipped in oil or butter, or of common pins or hair-pins bent near the head, with the view of entangling or hooking out extraneous bodies, seem to me well calculated to give pain and cause inflammation, without the possibility of doing good.*

Removal of the cause, even when of a mechanical description, does not always put a stop to inflammatory action; this, when once begun, often pursues its regular course after the exciting cause has ceased to act; and it must be controlled by the means which remain to be explained.

SECTION II.—GENERAL TREATMENT.

Protection from external influences.—Whatever further measures we may adopt, the organ must be protected from injurious external influences. Exertion of the inflamed part increases the disturbance, and aggravates the patient's sufferings. In serious cases, therefore, the eye must not be employed; nor must the sound eye be used when one only is the seat of acute inflammation. In less severe affections, passive exercise of sight may be allowed, although active exertion of the organ would be improper, such as in needle-work, writing, reading, particularly small print and by candle-light, employment before fire, or on bright or minute objects.

Exposure to light is generally painful, so that patients are disposed to avoid it. The necessary protection is obtained, in the worst cases, by darkening the chamber and closing the bed curtains. This is not often necessary; in general it is sufficient to exclude strong light by window-blinds, and to protect the eyes by the common pasteboard shade covered with green or black silk, by a shade of such silk stretched on wire, by green or black crape or gauze hanging over the face, or by coloured spectacles. These means of protection may be required only when there is much light; not in twilight, or in dull days.

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* *Lehre*, b. i. § 158.

It would be obviously injurious to expose an inflamed eye to the air in cold or rainy weather; and great vicissitudes of temperature should be avoided: but exclusion of air is not necessary in favourable states of the atmosphere. A warm, mild air, so far from being injurious to the organ, is grateful to the feelings of the patient, and beneficial to his general health; there is hardly any state of the eye in which it could be prejudicial.

General indications.—The measures already pointed out, of removing the exciting causes, and of protecting the organ against the injurious influence of exertion, light, and air, are only to be considered as preliminary, and auxiliary to the main object, that of arresting inflammation by appropriate means. Although the process of inflammation is in many cases very violent, and though the sufferings which attend it are often extremely acute, yet its tendency and effect, with reference to the termination of the disturbance, are upon the whole restorative. Within certain limits, it does not tend to disorganize and destroy the part; but is rather calculated to bring it back to a healthy state. Thus it may arise, become fully developed, and decline in an organ, without any medical treatment, leaving the part as healthy as it was before. When violent, however, it suspends the functions of a part; hence, in organs, whose constant exertions are necessary to the continuance of life, it must be speedily arrested, or life will be lost. But the eye does not belong to this class, and we are guided by other views in the treatment of ophthalmic inflammation. Its various effects, particularly mortification, suppuration, and effusion, may render the organ more or less incapable of executing its office after the inflammatory disturbance has ceased. Even the least important of these, interstitial deposition, may seriously and permanently impair the function of a delicately organized part like the eye. It will enlarge, thicken and harden a part; it consolidates and unites structures which were previously loose and separate; it renders parts, which were naturally transparent, opaque. These various changes may result, not only from violent inflammation, but from such a degree of it, as in most other instances would be deemed unimportant. Supposing the cornea, iris, or retina to be affected, the case may present no serious symptoms; there may be no sympathetic disturbance of other parts. Yet, in the first instance, the texture may be rendered impermeable to light by interstitial deposition; in the second, effusion may obstruct the pupil, preventing or impeding the passage of light into the interior of the eye; and the third may be thickened so as to become insensible to luminous impressions. By either of these changes, according to its degree, vision may be either impaired or destroyed. It becomes necessary, therefore, to institute early, and to follow up steadily, bold and decisive antiphlogistic treatment, not with a view of removing danger to life, nor on account of the sufferings of the patient, which may not be very acute, but to prevent injurious changes in an organ, the perfect state of which is essential to the comfort and enjoyment of life. There is yet another reason why inflammation should be speedily arrested. The longer the vessels of a part remain distended, the more difficultly do they contract to their natural dimensions, the more readily do they yield to any new excitement. Thus the continuance of inflammation increases the difficulty of recovery, and the liability to relapse. The probability of subsequent inflammation is in proportion to the degree of disease that occurred in the first instance, and to the length of time it was allowed to continue.

Another consideration must not be overlooked; that is, the relief of the patient from the local suffering, and the general disturbance caused by active inflammation of an important organ.

Loss of blood.—Of the means for reducing inflammation, abstraction of blood is the most powerful. Blood is the material by which the increased action of the part is maintained. In the figurative language, which the obviously increased heat has suggested, we may say that it is the fuel by which the fire is kept up. If we could completely command the supply of blood, the increased action might be effectively controlled or arrested. In comparison with the loss of blood, all other means are of minor importance in lessening the local disorder and quieting the general disturbance.

General bleeding.—We have to consider, in the present instance, whether it is necessary to take blood from the system generally, or whether local depletion will answer the purpose.

Medical writers and practitioners have been usually satisfied with the latter; they do not seem to suspect that an inflamed eye can require more than the application of a few leeches. But if you mean to prevent change of structure in the organ, you must act much more vigorously. You will find it very often necessary to bleed from the arm, and that freely.

You might at first suppose that the best way of reducing increased action in any organ would be to draw blood from the part itself, to take away from it the material which keeps up the excitement. This, however, would be an erroneous conclusion. You can take blood out of a part, but a fresh supply is still poured in. General bleeding is the only mode by which you can cut off this supply. The external situation of the eye enables us to see the decided effect which a large bleeding has on the capillaries of the inflamed part; and I know no other example in which the efficacy of the measure is so clearly demonstrated. You see a person with the eye bright red, and very painful; he cannot face the light, and tears gush out with great suffering if he attempts to do so. You bleed to fainting, and immediately the capillaries are emptied, so that the organ resumes its natural paleness; the pain has gone, the eye is opened without difficulty, and the full influx of light can be borne without an uneasy sensation. For the time the part has passed from violent inflammation to a nearly natural state; and we cannot doubt that the change thus produced must have a powerful effect in arresting the disturbance. With the restoration of the circulation, the inflammation will recur after this temporary suspension; but its violence is diminished, and it often gradually subsides. General bleeding then is necessary in inflammation of the eye, to prevent the changes of structure that would subsequently impair the functions of the part.

I know of no criterion by which we can determine in all cases, whether general or local bleeding should be employed. If inflammatory fever co-exist with the local disorder, we should abstract blood from the system; but we cannot say conversely, that if such fever be absent, we ought to be content with local depletion; an inflammation of the eye, for example, may require free general depletion, although it should not be attended with fever.

The quantity of blood to be drawn from the arm must be such as will decidedly influence the circulation. We cannot determine the amount beforehand; we cannot decide that ten, twelve, or sixteen ounces will be sufficient; it may be necessary to take twenty, thirty, or forty ounces, or to produce syncope, if you cannot otherwise make the requisite impression on the vascular system. Professor JOHN THOMSON[*] says, that from twelve to twenty ounces may be taken, and that the depletion may be repeated two or three times in the twenty-four hours, if the case should require it. LANGENBECK,[†] after quoting this statement, adds, "this would be too much in our country. I usually take from eight to ten ounces, and repeat the depletion according to circumstances." If he can arrest active inflammation by venesections of this amount, his patients must be very differently constituted from the inhabitants of this country. I believe that it is the usual practice in France, Italy, and Germany, to take a small quantity of blood at a time, and to repeat the bleeding frequently; thus, venesection is not unfrequently performed night and morning for several successive days. This plan, which is adopted from the fear of injuring the patient by a large bleeding, drains his circulating system almost to the last drop, brings on excessive debility, and is less efficacious in arresting the local disorder. I have no hesitation in stating, that the object last mentioned is effected much more certainly by a large bleeding in the outset, and that this method accomplishes it at less expense to the constitution. I never saw a person injured by a single large bleeding performed for an active inflammation; while generally the strength is completely restored in twelve or twenty-four hours, even after bleeding to syncope. On the contrary, weeks and months often elapse before patients, who have been drained by repeated bleedings, recover their strength.

As the restoration of the digestive functions and the secretions diminishes the symptoms, where inflammatory fever is present, they, who are afraid of weakening by loss of blood, recommend in preference aperient and diaphoretic medicines. If you examine the history of cases treated in this way, you find that two, three, or more days are employed in these indirect attempts. Purgatives are given which do not operate; diaphoretics are tried, which bring on no discharge from the skin; the local inflammation increases, the general disturbance is aggravated, until the fever comes to an end, when the secretions and digestive functions are consequently restored. Abstraction of blood to a proper amount accomplishes the desired objects at once. When you have thus removed the load that oppresses the system, the suspended secretions are restored, evacuation of the bowels takes place speedily, and the patient breaks out into a profuse perspiration. Thus the sufferings of the patient are materially abridged, while the duration of the local disturbance is shortened; the latter being a very important point in the case of the eye.

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[*] *Lectures on inflammation*, p. 166.

[†] *Nosologie*, vol. i. p. 266.

A notion has prevailed that persons who live in London, or in other large towns, do not bear depletion well, and consequently that the loss of blood, which would be necessary in those who live in the country, would be improper in the inhabitants of the metropolis or extensive cities. I consider that this opinion is supported neither by experience nor argument. The inhabitants of London, from the highest to the lowest, with few exceptions, indulge their appetites freely; there are no small towns, nor any parts of the country, in which the consumption of animal food and stimulating liquors is more general. These habits, of which the injurious effects are aggravated in many instances by sedentary occupations or indolence, produce their natural consequences, namely, a plethoric state of the system, and an abundance of inflammatory disease, both of which circumstances will be immediately recognized, on attentive observation, whether among the higher or lower classes. I have not the least doubt that inflammations are as common and as violent among Londoners as among countrymen; and that they require the same treatment in both instances. The dread of depletion has been transmitted from one to another without examination or inquiry, and has led to an inert practice, under which disease has too often been suffered to proceed almost uncontrolled.

In cases of inflammation affecting the entire globe of the eye, in inflammation of the external proper tunics affecting both eyes, or where it is very severe in one, general bleeding should be resorted to.

Local bleeding.—The next mode of taking blood in point of efficacy, is by cupping either from the back of the neck or the temple, especially the latter, from which part blood can be obtained quickly and in large quantity. Branches of the temporal artery are commonly wounded in this operation, facilitating the abstraction of the blood, and causing neither danger nor inconvenience. I have constantly been in the habit of taking away blood in this way with the best effect.

Blood may be drawn from the eye by the application of leeches, and these should be applied as near to the part affe ed as possible. The best situation is upon the lids; the only inconvenience which results from applying them here is a slight ecchymosis, which occasions for a few days an unpleasant appearance. It has been proposed to apply them to the mucous lining of the lower lid, that they may draw blood directly from the conjunctiva: they are easily put there, but the application of them to the external surface of the lower lid will answer the same purpose. It is a common error here, as in other inflammations, to apply them in too small a number; if the disease be active and the patient adult, it will seldom be proper to put on fewer than twelve, while eighteen or twenty-four will more frequently be necessary, in order to produce decided benefit.

Opening the temporal artery is, I think, less advantageous and convenient than cupping. We sometimes do not get blood enough, and sometimes there is either a difficulty in stopping the bleeding, or it breaks out again. To prevent this, compresses are placed on the artery, and secured by a bandage encircling the head, the pressure of which on the brow and forehead often renews and aggravates the sufferings of the patient. The subsequent formation of a small aneurism is not a very uncommon consequence of arteriotomy; it requires an operation for its cure. Under many circumstances cupping on the temple cannot be effectively accomplished: arteriotomy must then be resorted to. Opening the jugular vein is a troublesome and inconvenient operation; and you are frequently unable to get the quantity of blood you want in this way; it is now seldom resorted to, at least in ophthalmic cases.

The continental practitioners apply leeches, in certain cases, not to the eye, but to other parts. They lay great stress on the influence of suppressed hemorrhage in causing ophthalmia, and consider that the organ will be most naturally relieved by reproducing the bleeding, or by drawing blood from the part which has usually poured it out. They accordingly recommend the application of leeches to the labia pudendi, to the anus, and to the ala nasi, when the ophthalmia is supposed to arise from the suppression of menstruation, hœmorrhoidal discharge, or epistaxis. This seems to me a roundabout way of getting at the inflamed part; and it is a kind of refinement that must have proceeded from learned heads. Common sense would never have suggested the application of leeches to the arms or vulva for curing an inflamed eye: I have, however, no experience of the practice.

Scarification of the conjunctiva used to be very common, and it is still employed much more frequently than it ought to be. Can we expect to diminish inflammation by making a number of wounds in the inflamed part? Can we doubt that such a proceeding would increase the mischief? It gives considerable pain, and causes very little discharge of blood. In active inflammation, therefore, scarification of the conjunctiva must be absolutely proscribed, and there are very few cases of chronic ophthalmia in which it is beneficial. Bleeding from the frontal vein, or from the facial at the inner corner of the eye, has deservedly passed into disuse. But little blood can be procured in these situations; leeching is therefore more efficacious.

Local bleeding may be resorted to with advantage, when the urgent symptoms have been subdued by general depletion; or it may be employed alone in cases of a less serious description. Cupping is a kind of intermediate measure, although the blood is taken from the capillaries. An expert cupper will draw twenty ounces from the back nearly as soon as we can take it from the arm: we cannot therefore suppose that there is any material difference in the effect upon the system in the two cases.

The foregoing observations are applicable to the treatment of inflammation, especially in the eye, when it is acute, so as to endanger the organ, and when the patient is strong. Of these two circumstances, however, the condition of the organ is, in the case of the eye, the most important. I do not recommend that general bleeding should be adopted in all inflammations. In many cases it is necessary to abstract blood both generally and locally; in others, local bleeding alone will be sufficient; while in some it is not necessary to take blood at all. The state of the part, more especially as regards the probaiblity that the continuance of inflammation may produce effects capable of impeding its functions, that of the constitution and strength, and the age of the patient, must be considered.

Purgatives and diet.—It is not sufficient, in the treatment of inflammation, to diminish the quantity of the circulating fluids by the abstraction of blood; we must prevent the introduction of further supplies into the vascular system by the use of purgatives and the regulation of diet. We employ purgatives in the first instance, to clear out the alimentary canal, and this in general gives considerable relief. For this purpose we may administer a dose of calomel alone, o combined with jalap, rhubarb, or the compound extract of colocynth, and follow it in a few hours by the common aperient draught of infusion of senna, with Epsom salt and manna, or a dose of castor oil. We then give neutral salts in small doses at regular intervals, so as to keep up a regular action of the alimentary canal, or a more active purge from time to time.

In the worst cases of inflammation, the diet should consist chiefly of fluids, those of a diluent, slightly mucilaginous or acidulated kind. Simple water, toast-water, barley-water, apple-water, lemonade, tea, thin gruel; such is the bill of fare for a patient labouring under a serious local inflammation, with febrile disturbance of the system. In less important instances, with tea or gruel, a little toasted bread or biscuit may be allowed; also ripe fruits or roasted apples. In still milder cases, fermented liquors or animal food ought not to be allowed; the use of these would be quite inconsistent with loss of blood: we should not go beyond broths, milk and farinaceous articles, vegetables, light puddings.

Other internal remedies.—Loss of blood, purging, and abstinence, are the three great means of reducing inflammation; but there are other auxiliary measures. Nitre, the liquor ammoniæ acetatis, and the alkaline salts neutralized by lemon juice or the citric acid, are called refrigerants or cooling medicines. If not very efficacious, they are agreeable to the patient; and the latter are a pleasant vehicle for aperient salts, antimony, digitalis or colchicum.

Antimony is one of the most powerful internal remedies of the antiphlogistic kind; especially two of its preparations, the tartrite and James's powder. According to the amount of its dose, emetic tartar excites perspiration, nausea, or vomiting. For the first purpose it is given in a saline draught in the dose of one eighth or a quarter of a grain; a quarter or half a grain, repeated at short intervals, will excite and keep up nausea. In doses of a grain or a grain and half, it produces sickness. When this is kept up by repeated doses of the medicine, the action of the vascular system is very considerably reduced; and, perhaps, we have no other single medicine capable of acting more powerfully in this way. The employment of the remedy, so as to keep up full vomiting for some hours, has been recommended with the view of cutting short acute ophthalmia. By diminishing the heart's action, by lessening the force and frequency of the pulse, it will certainly reduce local inflammation. But, severe as this treatment is, it will not cut short inflammation of the eye. Moreover, the congestion in the head, caused by the violent straining in vomiting, acts unfavourably on the inflamed organ. When a foul and loaded state of the tongue, bad taste in the mouth, and nausea, indicate a disordered stomach, an ordinary emetic may be used after abstraction of blood. If this condition of the stomach, with costiveness, should be the only obvious cause of the inflammation, as it sometimes is where the mucous membrane is the seat of disorder, and the latter should not be very violent, the emetic, followed by an active purgative, may be employed without bleeding. Ipecacuanha and the tartrite of antimony may be given in the usual combination; or a grain of the latter may be administered in solution every half hour, till the requisite effect is produced. The latter remedy generally purges as well as vomits.

The Italian physicians class emetic tartar among the most powerful contra-stimulants, or means of combating inflammation; ascribing to it in this respect an efficacy independent of its action on the skin or alimentary canal. With this view they give it in large doses, sometimes as much as a dram in twenty-four hours. I have used it frequently with great benefit in doses of a grain or a grain and a half every two hours, in internal inflammations, particularly of the chest; but I have not employed it in this way in ophthalmic inflammations.

Mercury is another antiphlogistic remedy of considerable power. It has long been observed that the free exhibition of calomel, after direct depletion, has a very favorable effect in preventing the changes of structure so frequently produced by inflammation, and in expediting recovery. After the abstraction of blood, and the evacuation of the alimentary canal, calomel may be given in doses of from two to five grains, alone, or combined with a small quantity of opium, and repeated every six or eight hours. Affection of the mouth has rather accelerated than retarded recovery. I shall consider at greater length the use and action of this remedy, when I come to the internal inflammations of the eye. I have entered at large into this subject in my *Treatise on the Venereal Diseases of the Eye;* p 171 to 183, and 193 to 203. I will only observe at present that its employment may be begun in ophthalmitis as soon as the violence of the symptoms shall have been lessened by the general antiphlogistic means.

I have mentioned the use of colchicum in CHAPTER XI. on *rheumatic ophthalmia,* and in CHAPTER XVII. SECTION IV. on *rheumatic iritis.* This powerful remedy might perhaps be employed with advantage in ordinary external ophthalmia, in which the sclerotica is the principal seat of disease; but I have not yet used it in such cases.

Counter-irritation.—When inflammation has been checked by the means already specified, counter-irritation by blisters may hasten its removal, may prevent it from going into the chronic stage. An active inflammation in its full development, with all its sympathetic consequences, cannot be stopped in this way. Blistering under such circumstances only adds to the existing irritation and increases the patient's sufferings. The blisters should be applied at the back of the neck, or behind the ears: in active inflammation they should never be placed nearer to the eye than these situations. When they are applied to the forehead, temple, or side of the cheek, the inflamed organ may be included within the sphere of their irritation, with aggravation of the local symptoms: in this way I have often seen them decidedly injurious.

Local applications.—The measures which I have now pointed out, namely, abstraction of blood, local and general, purging, antimonials, mercury, blistering, aided by low diet, and the protection of the organ from injurious external influences, are those on which we confidently rely for subduing ophthalmic inflammation. They must be continued and repeated, according to the exigence of the case, until the inflammation is removed, and the natural state of the part is restored.

Although it may be stated generally that local applications are of much less importance than general means in the treatment of inflammation, whether of the eye or of other parts, they are often useful auxiliaries. At least, they relieve uneasiness, and patients have much faith in them; they wish for something to be done to the part, and while they persuade themselves that they derive benefit from washes, fomentations, &c., they induce medical men to place more confidence in them than they really deserve. The local application of cold by means of evaporating lotions, has a powerful influence in reducing increased action. For this purpose we may use cold water, rose water, iced water, saturnine lotion; the latter or rose water may be used with a little spirit to increase the evaporation; for example, one ounce of proof spirit, with half an ounce of vinegar, in eight ounces of rose water. Cold applications certainly diminish the heat of the part, and lessen the burning sensation which is felt under acute inflammation; but they often cause a chilled and aching feel, after they have been used for some time, in which case the wash may be warmed before it is applied, or it may be discontinued.

In many instances of ophthalmic inflammation patients find warm applications more agreeable than cold; and we of course comply with their feelings. We may employ warm water, the decoction of the poppy, or of chamomile flowers, or the steam of hot water.

We are hitherto unable to lay down any precise rule to determine the choice between warm or cold applications in particular instances. The latter are best in diseases which are quite superficial and in the incipient stage: they may cause contraction of the vessels, and thus restore the part to its healthy state. Warmth is found more advantageous when the inflammation is fully developed, or when it is seated deeply.

The preference of cold or warm applications, and the discrimination of the cases, to which they are respectively applicable, have long been debated points in therapeutics. I recollect when cold washes were used almost exclusively in inflammation; now, the warm are more in fashion.

Some employ a greater variety of local applications than I have mentioned; thus emollient and narcotic fomentations have been recommended; but I doubt whether these substances produce the effects which their names imply; whether, for instance, the skin can be softened by a decoction of marshmallow, and whether opium and other analogous remedies act through the entire cuticle. Opium will exert its particular influence when well rubbed on the surface of the body, and it has a decided sedative effect when applied to an ulcer, in the form either of ointment, powder, or lotion; belladonna and hyosciamus exert their singular property of dilating the pupil, when applied to the skin; but I have never seen any reason to believe that the aqueous solution of opium, used as a wash to the eye, or the addition of laudanum to other washes, has exerted any sedative influence on the part;[*] nor do I believe that poppy fomentation, or the other herbaceous infusions which have been used in inflammations of the eye, have any other effect than simple warm water. As this want of faith has been pointedly rebuked by my friend Mr. JAMES, in the recent edition of his instructive work on inflammation,* I will only observe that the substances above alluded to are very different from ammonia, tobacco, and lunar caustic, the local agency of which is too obvious to be doubted; but that the efficacy of vinegar, applied to the temples and pit of the stomach, in restoring a person from syncope, is not so unequivocal as he seems to imagine.

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[*] In a valuable "*report of cases treated at the ophthalmic hospital, Chatham,*" contained in the 68th number of the *Edinburgh Medical and Surgical Journal*, the author, Dr. SMITH, says, "In several cases in which the pain was very severe, and not alleviated either by blood-letting, or the use of anodyne fomentations, considerable and lasting relief was often procured by exposing the affected parts to the steam arising from the following mixture, brought to a boiling heat, for ten minutes two or three times a day. ℞. Mist. Camph. f℥ij; Tinct. Opii. f℥ss; Liquor. Ammon. Acetat. f℥ij; Aqua Ros. f℥iv." M.

Other local applications, although recommended from sources of high authority, hardly require notice. The Germans use various herbs and other vegetable substances in a dried form, inclosing them in muslin or linen bags, and placing them over the eye.† They change these herbs at different stages of the complaint, according to their supposed properties and the condition of the organ. I am at a loss to conceive how persons who know so much of this part of medicine, should persist in such ridiculous trifling.

SCARPA uses bags of mallows boiled in fresh milk, poultice of bread and milk with saffron, emollient and anodyne vapours conveyed to the eye with a funnel, and introduces white of egg and vegetable mucilage under the eyelids! I cannot conceive any application more unsuited to an inflamed eye than a poultice; nor can I view the practice above mentioned with any greater respect than the vulgar one of plastering the inflamed eye with conserve of roses, which is quite as scientific and judicious. The pulp of roasted apple, which is a popular application for an inflamed eye, is the lightest substance in a pulpy form; and retains heat and moisture well.

If the antiphlogistic treatment, which I have already pointed out, be instituted early, and followed up vigorously, it will cut short ophthalmic inflammation in forty-nine cases out of fifty; and if it does not fully accomplish this, it will so moderate the inflammatory excitement, as to prevent any alteration of structure capable of injuring sight. I speak with the greatest confidence, from long and uniform experience, of the decided advantage of employing the antiphlogistic plan to its fullest extent in the treatment of ophthalmic inflammation. Fears may be entertained that the loss of so much blood may debilitate the patient, and that these powerful measures are not necessary for an inflammation of the eye; but when the case requires depletion, it is much better, not only on account of the local affection, but even with reference to the general health of the patient, to cut short the disorder at once by active treatment, than to allow it to go lingering on for three or four weeks, by resorting to less vigorous means. Active measures possess the additional advantage of quickly restoring the functions of the eye. The great error has consisted in treating ophthalmic inflammation too much as a local affection, and relying accordingly on inefficacious local means. In a severe case, after taking blood from the arm, if the disposition to inflammatory congestion in the vessels of the organ should continue, we shall find it advantageous to cup on the temple, or to apply a considerable number of leeches round the eye. After bleeding the patient freely, and evacuating the bowels in the morning, and applying leeches or cupping, if necessary, in the evening, we shall generally find the patient greatly relieved on the following day. It will seldom be necessary to repeat the bleeding from the arm, but this does occasionally happen, and the repetition of cupping or leeches is often required. When the inflammation is subdued, a milder course of proceeding may be pursued until the powers of the organ are completely restored. For a few days, it is necessary to attend to the state of the bowels, and to regulate the diet. Most persons have a great delight in eating and drinking; thus, when these enjoyments have been abridged by illness, they are very anxious to return to their practice of stuffing. You must check this inclination, the indulgence of which is the most frequent cause of relapse.

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* Page 190.

† BENEDICT mentions among the ingredients with which these herb-bags are to be filled, elder-flowers and *dried emollient?* herbs, mixed with bran, flour! (particularly bean flower,) and chamomile powder. When the state of the eye requires means of a more exciting character, the bags are to be filled with chamomile flowers, sage, rosemary, thyme, and the resolvent species of the dispensatories; to which, if the organ should be still more torpid!! camphor is to be added.—*Handbuch der prakt. augenheilkunde*, vol. i. p. 40, 41.

Incision of the cornea in suppuration of the globe.—When, in consequence of acute ophthalmitis, general suppuration of the globe has occurred, and we see the anterior chamber full of matter, the evacuation of it by making a free opening into the cornea, will anticipate the period of ease to the patient, and put a stop to his sufferings, which would be protracted if we allowed the matter to make its way through the firm textures of the sclerotica and cornea. As the eye must inevitably be lost, we need not be deterred from adopting this course by any considerations of injury to the form of the organ.

SECTION III.—CHRONIC OPHTHALMIA.

INFLAMMATION of the eye is not always characterised by the same violent symptoms, nor does it always require the active treatment which I have just described. We often meet with cases in which there is preternatural redness of the globe and lids, without much pain as long as the eye is at rest. Active exertion of it, or exposure to strong light, will occasion painful sensations, and produce copious lacrymal discharge. Diminution of the transparency of the cornea, and more or less impaired vision, are sometimes joined to these symptoms. The organ may continue long in this state, and when it has existed for some time, the affection has been distinguished by the name of *chronic ophthalmia*. If the acute stage of inflammation should have been inertly treated; if the patient should have conducted himself imprudently by persisting to use the organ, or by not submitting to the necessary restrictions in diet; or if, after the inflammation has been in a great measure subdued, he should have begun to use the eye too soon, or have indulged in drinking or other imprudences, the chronic stage of inflammation may be prolonged indefinitely; the vessels continue preternaturally distended, the organ is in an irritable state, and easily excited into active and painful disease. In individuals of weak and unhealthy constitution, the acute stage of inflammation is short, the violent symptoms soon disappear, and the chronic stage of inflammation comes on and lasts for a considerable time. In old persons of unsound habit there is sometimes hardly any well marked acute stage, but the inflammation is of a languid chronic character from the beginning. SCARPA* represents the matter as if there were necessarily an acute and a chronic stage in all ophthalmiæ; he considers these as opposite in their nature and causes, and he prescribes opposite modes of treatment; namely, the antiphlogistic plan for the acute, and tonics combined with local astringents, and stimulants for the chronic. With this view he regards it as a matter of great importance to mark the precise period at which the acute inflammation ends, and the chronic commences. I consider this view of the subject altogether erroneous, both in principle and practice.

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* *Treatise*, &c. chap. vii.

The shorter the period of violent inflammatory congestion in any part, the sooner will the vessels recover. Hence if you treat acute inflammation according to the principles I have laid down, the local disturbance is removed, and the part never passes into the condition of chronic or protracted inflammation. But if persons through fear of debility are averse to letting out a little blood, and thus allow the disorder to take its course, the acute symptoms will very commonly be succeeded by chronic inflammation. If from this, or any other causes, chronic inflammation has supervened, the question arises, how are we to treat it? Are we with SCARPA to adopt the tonic plan, accompanied with local applications of an astringent or stimulating kind? Certainly not. We must look at the symptoms of the particular case, and regulate our treatment by them, not by the length of time the complaint may have continued.

Treatment of chronic ophthalmia; general means.— Since chronic inflammation is the same as acute in its essential nature, the difference being only in degree, it must be treated on the same principles. The local symptoms being less violent, and the sympathetic disturbances slight or altogether absent, it is not so often necessary to take blood generally as in acute inflammation; but the general abstraction of blood is by no means inapplicable or unnecessary in the cases technically called chronic. We can sometimes take blood from the arm with advantage after the lapse of many days or even weeks, as in a robust and plethoric person with a chronic inflammation affecting important parts of the eye. It is sometimes advantageous to take blood in moderate quantity in those states of plethora which I have mentioned as constituting the remote or predisposing cause of so many local diseases, and where no inflammation may yet have been excited in any organ. The local loss of blood by cupping on the temple or back of the neck, or by leeches, is frequently necessary, and that repeatedly in chronic cases. The antiphlogistic treatment, in short, must be continued, but in a less active manner.

The regulation of the digestive organs is a matter of considerable importance. We must, in the first place, clear out the alimentary canal, as we would in a case of acute inflammation; and we then adopt means to ensure the regular action of the bowels without purging. The substances which stimulate the large intestines, such as aloes and colocynth, are the best for this purpose. We may combine with them mercurial medicines, when unnatural colour of the fecal evacuations indicates an unhealthy state of the secretions into the alimentary canal. In this way blue pill may be given with aloes, compound extract of colocynth, or extract of rhubarb: or calomel may be employed in similar combinations.

If the tongue should be foul and loaded, with nausea, and want of appetite, the alvine discharges being at the same time unnatural, dark and slimy, it may be necessary to clear the stomach by an emetic, or to administer calomel with James's powder and extract of colocynth, following it after some hours with the ordinary purging draught of infusion of senna with Epsom salt. When the alimentary canal has been cleared, mercury may be given in the alterative form, mild aperients being occasionally resorted to. The compound decoction of aloes with infusion of rhubarb, or infusion or tincture of senna, are suitable forms.

Careful attention to diet is still required, although the inflammation is called chronic. This point indeed is just as important as the more strictly professional treatment. If we content ourselves with directing the medical or surgical means, and leave the patient to his own course in diet, we shall do little good. Even in the milder forms of inflammation, animal food should be taken only in small quantity, and fermented liquors are quite inadmissible. Tea, milk, gruel, broths, bread, and the various farinaceous articles, vegetables, and fruits, will supply sufficient gradations between the scanty fare of fever, and the full diet which is taken in health. When the local excitement is completely stopped, and the general disturbance has ceased, when the tongue is moist and clean, when, in short, the patient is well, he may return to common diet, but not before.

Such are the means, dietetic and medical, of removing the remote or general causes of local disease in the numerous class of spontaneous inflammations. When, however, the nervous system has been considerably weakened by great mental exertion, sedentary habits, residence in bad air, or other depressing influences, the measures just described will not be sufficient. We must resort to some means of strengthening this system, and restoring its energy. The materia medica spreads out its stores of tonics, cordials, and stimulants for our choice, and these are sometimes employed with advantage; but they are far surpassed by pure air, bodily exercise, and tranquillity of mind.

When acute ophthalmia has been arrested by active treatment, it may be well to rest a little, and not to proceed immediately to new measures in order to guard against the imaginary evil of weakness. Allow an opportunity for the restorative powers of the part, and the constitution, to exert themselves. It is not necessary in medicine and surgery to be always doing something; to keep up an incessant fire of medicines and local applications. Nature will not stand still, even if the surgeon allows himself a little leisure; she proceeds, although the treatment be intermitted, in restoring the part to its healthy state.

If the powers of the system should be really reduced by the long continuance of disease, and the necessary treatment, it may be expedient to adopt direct measures for invigorating the system. Nutritious diet, the moderate use of fermented liquors, good air and exercise, are the best restoratives: these should be combined with moderate use of the organ, which should be freely exposed to the air, and as much to the light as its irritability will allow. If the debility should seem to require, and more particularly if the patient should think that it calls for, the aid of the materia medica, we must employ the vegetable tonics and mineral acids.

Local measures; counter-irritation.—This is more applicable to chronic than acute inflammation; and we select in the former those means which have a more powerful and permanent action. Blisters are sometimes used, and afterwards the savine ointment. But the tartar emetic ointment rubbed behind the ear, or on the back of the neck, and seton or issue in the temple, are more commonly resorted to. The permanent counter-irritation produced by the two latter measures is a very efficacious remedy in obstinate chronic ophthalmia. No other plan will so decidedly arrest chronic inflammation at its outset, and at the same time put a stop to incipient changes of structure, as this artificial discharge in the neighbourhood of the eye, combined with the general treatment already described.

The integuments of the temple may be pinched up into a fold, so as to allow an elastic gum seton-tape, or a piece of cotton wick, to be introduced in the usual way. Or an oblique incision may be made in the fold of skin with a double-edged knife, so as to turn up a little flap, under which two or three peas may be placed. The seton or issue should be made as far back as may be convenient, that the scar may be less conspicuous.

The most troublesome examples of chronic ophthalmia are those in which acute inflammation has been totally neglected, or very inefficiently treated. Among the poor we see many such cases, in which the vessels have become permanently enlarged, and changes of structure have occurred in the surface of the organ from the long time which has been suffered to elapse without resorting to effectual means. This chronic excitement, probably kept up and aggravated by the patient pursuing his ordinary occupation and mode of living, is very difficult to remove, either by local or general treatment. Steady attention to diet, the regular use of aperients, repeated applications of leeches, combined with seton or issue in the temple, are the most essential points of treatment. To these may be added the local application of stimuli and astringents in the manner which I shall proceed to describe.

Use of stimuli and astringents.—The points which remain to be considered in the treatment of chronic ophthalmia are, the question as to the use of local stimulants and astringents; the time and circumstances under which, if useful, they are to be employed; and the particular remedies of this kind which are preferable. When the eye is preternaturally red, when it is weak and irritable, when exertion of it or exposure to light causes watering and pain, though it may be easy while at rest, stimulants and astringents are resorted to with the view of causing the distended vessels to contract, and thus removing what remains of inflammatory excitement. Of stimulants, the vinum opii, or vinous tincture of opium, has been much employed, both in this country and on the continent, in consequence of the recommendation of it by the late Mr. Ware;* I do not know whether it was first introduced into practice by himself or his partner, Mr. Wathen.† The mode of employing it is to introduce half a drop, a drop, or two drops, between the palpebræ, so as to bring it into contact with the inflamed conjunctiva. The fluid may be taken up with a quill or a director, and, while the patient rests his head back, it may be dropped into the internal angle of the eye, so that when the lids are separated it may be diffused over the globe. The first effect is a sharp, smarting sensation, accompanied with a discharge of tears; but when this has gone off the patient generally feels relieved. The stimulus applied to the distended vessels is supposed to promote the contraction of them, and thus facilitate the recovery of their natural dimensions. It is employed once or twice a day. The vinum opii is the tinctura thebaica of the old London pharmacopœia, that is, of 1745, the ingredients of which were, an ounce of opium, half a drachm of cinnamon and of cloves, and half a pint of sherry wine. The opium and aromatics were macerated for eight days in the wine, and the tincture was then strained. In the modern pharmacopœias the tinctura thebaica was omitted, and a spirituous tincture, the present tinctura opii, substituted for it. MR. WARE ascribed a peculiar virtue to the combination of ingredients in the old preparation; he thought the spirituous tincture had not the same effect, and he found that opium alone, or wine alone, would not accomplish the purpose. I believe it was in consequence of MR. WARE's recommendation, and the general use of the remedy in ophthalmia, that the College of Physicians again introduced vinum opii into their pharmacopœia: but it is singular that, as the efficacy of the remedy was so pointedly ascribed to the precise combination of ingredients in the old formula, it should have seemed fit to that learned body to diminish the quantity of opium one-half. MR. WARE informs us in a subsequent edition of his treatise, that this new form is just as efficacious as the old, in which opinion I quite agree with him. According to MR. WARE's representations, it is a remedy of sovereign virtue. He seems to have used it indiscriminately in all cases of ophthalmia, both acute and chronic; in acute, combined with leeches, blistering, purging, and the treatment ordinarily called antiphlogistic. Without any particular specification of case, he directs the vinum opii to be dropped into the eye two or three times a day, in conjunction with other remedies. For my own part, I should never think of using it in acute ophthalmia; in such cases it would rather increase the inflammatory disturbance, though I must observe, at the same time, that it is not a very active remedy, and that it cannot do much mischief. Its employment should be restricted to cases of chronic inflammation, in which we have only to regret that its efficacy should fall so far short of the virtues ascribed to it. Having seen it often used, I hardly remember any case of a serious or obstinate kind, in which it alone has been decidedly effectual in arresting the disorder. It may afford a temporary relief to the patient, but I believe that if its use should be altogether abandoned, there would be no diminution either in the number of cures or in the time employed in effecting them.

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* *Remarks on the Ophthalmy*, &c.; 1780.

† *Ibid.* Preface, and p. 53.

Weak brandy and water is a popular remedy for bad eyes, and is used without any discrimination of the nature or period of the affection. However, being applied externally, it is only to be considered as a cooling wash.

The liquid laudanum of SYDENHAM is frequently mentioned by foreign writers; it is the old tinctura thebaica, with the addition of half an ounce of saffron.

Various astringent metallic salts are employed in chronic ophthalmia, in the form of solution. Alum, in the proportion of from four to ten grains to an ounce of distilled water; sulphate of zinc or copper, from two to six or eight grains; nitrate of silver, one to six grains: oxymuriate of mercury, from one-eighth of a grain to one or two grains in the ounce of water. These solutions must be introduced between the palpebræ so as to come in contact with the inflamed surface. Their efficacy in common inflammation seems to be about equal to that of the vinum opii. In cases of purulent ophthalmia they have a more decided effect, as I shall have occasion to mention hereafter. The liquor plumbi subacetatis, undiluted, is used as an astringent. It might seem at first that it could not be safely applied to the eye in this state; but it is by no means an irritating application, though powerfully astringent. A French oculist, M. ST. IVES, has proposed a remedy, which has been much employed on the continent under the name of lapis divinus. It is composed of a singular mixture of ingredients: an ounce of alum, nitre, and sulphate of copper, respectively, are fused together in a crucible: half a drachm of camphor is added towards the end of the process. A solution is made containing ten grains of the mixture in six ounces of water, the strength of which is to be increased according to circumstances. Such a mixture cannot of course have any effect differing from that of simple solutions of the metallic salts. A German writer, CONRADI, has recommended a collyrium, which is often mentioned in the writings of his countrymen; it is composed of one grain of oxymuriate of mercury, six ounces of rose-water, one dram of mucilage of quince seeds, and half a dram or a dram of the liquid laudanum of SYDENHAM.

It may be observed generally, with respect to all these proposed remedies, that if active treatment be resorted to in the first instance, and followed up steadily, they are not wanted; and if insufficient means have been employed, so that a state of chronic inflammation is produced, this is a complaint which it is extremely difficult to remove, and which is not likely to yield to the vinum opii, or any remedies of that class.

The use of strong astringents, more particularly the nitrate of silver, which has been found advantageous in inflammations of the conjunctiva, has been extended by MR. GUTHRIE to other forms of ophthalmic inflammation, both acute and chronic. He proceeds on the principle "of exciting an action greater, and of a different nature, to that already existing in the part." He prefers the form of ointment to that of solution, on account of its more permanent action: and he has recommended the two following formulæ: viz.

1. ℞. Argenti nitratis gr. ij. ad x.; liq. plumbi subacet. gtt. xv.: ung. cetacei ʒj.

2. ℞. Hydrarg. oxymur. gr. iij. ad iv; liq. plumbi subacet. gtt. xv.; ung. cetacei. ʒj.

The saline substances must be reduced to an impalpable powder, then mixed with the ointment on a slab, and the liquor plumbi added. It may be done in a glass mortar. These ointments are most stimulating when first made; they gradually become less so; but weeks elapse before they are inert.

"The manner of using either ointment is by introducing between the lids a portion, larger or smaller as the case may seem to require it, from the size of a large pin's head to that of a garden pea. The eye-lids being closed, are to be rubbed gently with the finger, so as to diffuse the dissolving ointment over the whole surface of the conjunctiva: a part of it usually, however, works out by the motion of the lids, and should be wiped off (if the nitrate of silver) to prevent its staining the skin. Both ointments cause pain: in some persons it is considerable, in others less so, lasting from half an hour to an hour and a half; and, when the ointment is newly made, sometimes for four hours, and even until the next day. On the subsidence of the pain caused by the ointment, that which previously existed is found to be relieved, if not entirely removed; and on the subsequent day, the patient usually acknowledges the benefit he has received with regard to all the symptoms. When the application has been severe, and the patient very irritable, a state resembling white chemosis occasionally takes place, and appears formidable to a person unacquainted with the effect of the remedy: it soon, however, subsides. The eye should be fomented with warm anodyne fomentations. I rarely repeat the application until the third day; but the feelings of the patient are the best guide, the return of some of the old sensations indicating the necessity for its use, which should be, if possible, anticipated. In some cases of acute inflammation, two or three applications will arrest the progress of a serious inflammation, and effect a cure. In chronic cases the ointment must be continued for a considerable time, and occasionally alternated with other remedies. Where it creates a state of regularly increased irritation, as it sometimes will do, cupping, purgatives, &c. are of service; when the remedies may be again resorted to." MR. GUTHRIE has generally used purgatives, but has sometimes found the ointments successful in serious complaints without any internal medicine. Sometimes they have disagreed altogether. In the *London Medical and Physical Journal*, New Series, No. 27, from which the preceding account is derived, as well as in the 31st No. of the same work, numerous cases are recited in illustration of the treatment. They are chiefly instances of chronic inflammation, purulent, common, and strumous, with thickening of the conjunctiva, opacity, vascularity, and ulcers of the cornea. At present, MR. GUTHRIE seems to employ almost exclusively the ten grain nitrate of silver ointment.*

General summary of treatment in ophthalmic inflammation.—If I were to sum up generally the directions for treating ophthalmic inflammation, I should say, that in the young and strong, in persons of full habit, and in those individuals whose circumstances give them a command, not only of the necessaries, but of the comforts and luxuries of life, we should arrest inflammation by active antiphlogistic treatment; and then there will be no chronic stage, but the healthy structure and functions will be restored by the natural powers of the system.

In older and feebler subjects, especially in females, in those whose constitution is debilitated by excessive labour, by scanty, unwholesome nutriment, exposure to cold, and deficiency of clothing, by a want, in short, of the domestic comforts of life, we should be more cautious in depressing the general powers of the system. A milder antiphlogistic treatment should be resorted to, and when we have put a stop to the inflammatory excitement, we should invigorate the system by a better diet, by the moderate use of fermented liquors, by a change of air, if practicable; and to these means may be added the use of tonic medicines and local astringents. We must bear in mind, however, that very active local inflammation may take place in weak states of constitution. In old and feeble persons, we often meet with such a degree of ophthalmic inflammation, as will require considerable depletion. In many cases it seems as if the depression of the general powers of the system rendered the local disturbance more obstinate.

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* *London Medical and Surgical Journal*, vol. i. p. 265.

It remains for future experience to decide on the merits of the local treatment recommended by MR. GUTHRIE; to determine whether these powerful stimuli can be safely and advantageously applied to the organ in the various stages and forms of ophthalmic inflammation for which he advises them. The necessity of proceeding cautiously with these strong applications to a part so highly organized and easily irritated, if not obvious of itself, would be apparent from what he states, viz. that they are sometimes hurtful, and that in other cases they cause so much inflammation as to require the loss of blood by cupping and leeches, and other antiphlogistic treatment.

CHAPTER VI.

Wounds of the Eye and its Appendages.

I HAVE already observed, that inflammation is frequently produced by external injury, and it will be best to put together in this place all I have to say respecting wounds of the eye and its appendages. The general principles of treatment are the same for all wounds. Extraneous substances are to be removed, and the sides of the wound approximated; the patient must be kept quiet, and such local and general means employed as are best calculated to prevent inflammation. These circumstances should be attended to in wounds of the eye and its appendages, even more carefully than in other instances, on account of the great importance of the organ, and its susceptibility of inflammation.

Ecchymosis of the eye-lids.—The eye-lids, the eye-brows, and the anterior surface of the eye, are liable to ecchymosis. Effusion of blood into the texture of the part produces those livid, blackish, or bluish marks in the palpebræ and surrounding skin commonly termed a black eye. Much loose cellular texture enters into the composition of the lids, and the effusion which takes place is sometimes considerable. The palpebræ may be distended by a projecting convex swelling, and in pugilistic contests the eyes of the combatants become in this way completely closed. On such occasions the seconds are in the habit of performing a kind of chirurgical operation, without having received any diploma from the College: they make an opening in the skin with a lancet, and squeeze out the blood, by which expedient they enable the combatant to see his way a little longer. Ecchymosis is often occasioned by the application of leeches. In whatever way these external marks are produced, individuals are generally desirous of getting rid of them, and surgical assistance is sometimes sought for that purpose. The question is, whether we can adopt any means to hasten the removal of this discolouration? Absorption will accomplish the business in a certain time, and it is doubtful whether we can abridge the period by using any of the articles termed discutients. The muriate of ammonia, dissolved in a mixture of vinegar, spirit and water, is employed for this purpose, and will do as much good as any thing. The liquor ammoniæ acetatis may be used, alone or mixed with rose-water; or the liquor ammoniæ, mixed with soap liniment, may be rubbed on the part after two or three days, as such stimulating applications are supposed to be capable of accelerating the process of absorption. There is a quack preparation, called "pommade divine," composed apparently of unctuous and aromatic ingredients, which is used for this purpose; it is an agreeable sort of salve, but I cannot say, from experience of its virtues, whether it is likely to promote the disappearance of the spots produced by ecchymosis.

Ecchymosis of the conjunctiva, accidental and spontaneous.—The conjunctiva is subject to ecchymosis from blows inflicted on the eye; it produces an uniform reddish brown appearance, as if blood were injected into its texture. This appearance sometimes comes on spontaneously. The appearance of the part frightens the patient, and may puzzle a surgeon not conversant with the phenomenon. It is distinguished from inflammation by the absence of distended vessels, of pain, and all other inflammatory symptoms; and by the uniform dark reddish brown tint of the discolouration, which continues to the edge of the cornea, and there terminates abruptly. The absorbents will generally remove it in about ten days or a fortnight, and I am not aware that we can do any thing to accelerate its disappearance. A weak solution of sulphate of zinc may be used as a collyrium. I never saw an instance of this discolouration remaining, or of its leading to unpleasant consequences.

Wounds of the eye-brows and lids.—In incised or lacerated wounds of these parts, it is of consequence to bring the separated edges accurately together; for, if this be neglected, serious inconvenience and deformity may remain after the healing. In longitudinal wounds of the palpebræ, I have seen a permanent slit in the shape of the letter V, like the fissure in hare-lip, *(coloboma,)* produced from negligence in this point. Inversion or eversion of the palpebræ may take place from the same cause, and occasion considerable deformity as well as serious inconvenience. I have seen a case in which a horizontal wound of the upper lid having been neglected, a sort of button-hole was formed from the edges not having been kept in apposition; what was worse, accretion of the conjunctival surface of the palpebræ to the globe had taken place, and the lid hung so much over the globe as to render the eye almost useless. This shows the necessity of attending to such wounds, however slight and inconsiderable. I was consulted some time ago by a gentleman who had been thrown from his horse, and received a wound of the eyebrow, so that about one-third of it, being the middle portion, was detached and torn down towards the lid. From inattention to the management of the accident, the detached part of the brow healed below the level of the rest; producing a remarkable and by no means becoming appearance. This gentleman, who was handsome, rejected my advice of letting it remain as it was, and wished me to adopt any proceeding for removing the deformity. I made a vertical incision on each side of the displaced part, united the incisions transversely above, and dissected off the portion from its new situation, leaving it adherent below. Of the flap thus made I cut off the upper portion, corresponding to the depth of the eyebrow; and then secured the remainder in its proper position by sutures. It adhered readily, and the operation seemed to have succeeded perfectly, when the patient left England for a long absence on the continent.

In wounds of the brows and lids, adhesive plaster is not sufficient for keeping the parts in exact apposition; it will be necessary to unite them by sutures, such as will not irritate the parts, using small, thin, sharp-cutting needles, with single silk threads. We should employ such a number of sutures as may be necessary to unite the parts in their proper relation to each other. Lay over the part soft linen rag dipped in cold water, use this application frequently, keep the patient quiet, and attend to his bowels. The sutures may be cut out in twelve, eighteen, or twenty-four hours; in that time the edges of the wound will have become agglutinated either by coagulated blood or coagulable lymph, so as to remain subsequently in proper apposition. We thus avoid all irritation from the sutures, which does not come on in so short a time. By these measures the union of the parts is effected very speedily and completely. This mode of proceeding is particularly necessary in wounds of the lid, in which it is more difficult to preserve an accurate adjustment than in those of the brow. After wounds in this neighbourhood, the lids are often considerably swelled by serous effusion, which is of no consequence. The eye-lids inflame and swell from the stings of bees and wasps, the bites of gnats and other insects. BEER* mentions that he saw in two cases, where the stings of bees had been left in the wounds, mortification, with danger of life, in a day and a half. It would be proper therefore to extract the sting, and to employ cold applications, as saturnine lotion, or vinegar and water.

Amaurosis from wounds of the eye-brow.—Wounds of the eyebrow, and neighbouring frontal region, are sometimes attended with more serious consequences than mere alterations in form, and the consequent effect on personal appearance. A violent blow in this situation, with or without wound, may affect the globe, as well as the external soft parts; may cause serious injury by concussion, without external wound, and thus sight may be impaired or entirely destroyed. I shall speak subsequently of concussion of the retina.

The bone may be fractured, and the anterior cerebral lobe injured; or the fracture may extend along the thin, brittle, orbital process of the frontal bone, reaching to the optic nerve, or to the union of the two nerves. In such cases injury to sight, in various degrees, will probably accompany the external wound, but the state of vision is here a subordinate point;

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* *Lehre*, v. i. p. 234.

our attention is called to the danger of life, and the means we resort to for averting it will probably be equally advantageous to the eye. It is obviously necessary, in all such accidents, for the surgeon to examine the globe carefully, and to ascertain, as soon as the circumstances will allow, whether vision is injured or lost.

Other cases have been mentioned, where the direct injury has been confined to the soft parts of the brow, without any fracture, or any concussion of the globe, and yet amaurotic weakness of sight, or actual blindness, has supervened sooner or later. HIPPOCRATES has made the remark, that wounds of the eyebrows often cause blindness; several learned men have commented on this remark, but I know of none who have attempted to illustrate the point by facts. BEER, however, states that he has had frequent opportunities of accurately observing and curing amblyopia (weakness of sight) and amaurosis (loss of sight) occurring in consequence of wounds of the eye-brows: Mr. WARDROP,* too, speaks as if he had seen such cases. The amaurosis or amblyopia, according to BEER, may immediately follow the injury, or come on soon after; it may occur during the healing, that is, during the process of cicatrisation, or some time after the cicatrix has been completed; or it may be the consequence of simple bruise without wound. The affection may be developed rapidly or slowly.† The instances referred to are incised or lacerated wounds, embracing the trunk or principal branches of the frontal nerve, and BEER regards the injury of this nerve as the determining cause of the amaurotic affection. However, he applies this explanation to what he represents as the most frequent case, viz. that of the impaired vision coming on during the cicatrisation, or after its completion. He says, that where such wounds are judiciously managed and speedily healed by adhesion, no bad consequence ensues; but that when suppuration occurs, followed by the granulating process necessary for secondary union, the divided nerves are involved in the inflammation, and subsequently included in the hard cicatrix, and, as he conceives, compressed and irritated. He observes, that among the numerous cases which he has seen of such wounds, only two instances have occurred of complete amaurotic blindness, in both of which it did not appear till some length of time after the healing of the wound. His treatment, founded on this view of the cause, consists in dividing the nerves included in the cicatrix. He states, that in the two cases just mentioned, the patients were completely restored to sight by cutting down to the bone, close to the supraorbital foramen, so as to divide all the branches of the frontal nerve.

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* *Essays*, vol. ii. p. 179.

† *Lehre*, vol. i. § 195.

Last summer I saw a gentleman, about twenty years of age, ten weeks after he had received a violent blow on the left eye-brow. The skin was divided, but the patient was not stunned, nor did he experience the slightest headache, either at the time or afterwards. The lids were greatly swollen after the injury, probably from ecchymosis, so that he could not open the eye. When he did open it, at the end of a few days, he could see nothing, although the surgeon informed him that there was no perceptible change in the eye. He was bled, purged, and confined to low diet. I found the appearance of the eye quite natural. The pupil contracted and dilated in sympathy with the other, but its independent motion was completely lost. It became dilated when the opposite eye was closed, and remained motionless in that state. Vision was extinct, so that the difference between light and darkness could not be distinguished. There was a small cicatrix on the eye-brow, near the external angle of the eye.

About the same time I was consulted by a young lady, in whom the eyebrow and lid had been much lacerated in consequence of a fall from her horse. There was imperfect amaurosis of the eye, which did not seem to have experienced direct injury. The pupil was moderately dilated.

In some cases, it is doubtful whether the amaurosis following blows on the head is determined by the particular nature or sympathies of the organ or texture immediately injured. In October 1827, I saw a gentleman, thirty-two years of age, who had been thrown from his gig seven weeks before, and had fallen on the head. He was completely stunned, and remained insensible for some hours. According to the account of the surgeon who attended him after the accident, there were appearances indicating that the head had come in contact with the ground above the right eye-brow, where the skin afterwards exhibited the discolouration of a slight bruise; there was neither bruise, ecchymosis, nor any direct injury to the globe, conjunctiva, upper eye-lid or eye-brow. The eye, in which vision had before been perfect, was totally blind, and had continued so in spite of the treatment adopted for the accident, as well as in reference to this particular affection. When I saw the patient, there was no trace of injury to the part which had been struck. When both eyes were open, no difference could be observed between them; the pupils were perfectly alike in size, colour, and movement. When the left eye was closed, the right pupil dilated moderately, and remained fixed in that state under every variation of light. When the left eye was opened again, the right pupil contracted. When both eyes were open, the right pupil dilated and contracted just as the left. The right eye was absolutely insensible to light; the left suffered a little sympathetically.

A lady was thrown out of a gig, and came to the ground on the head and side; she was stunned, but soon recovered. Bruise and ecchymosis of the right temple and eye-lids were observed; but the latter were not closed. She was confined to her bed, in consequence of the injury to the side, for five weeks, at the end of which time she found the sight of the right eye affected. I saw her three months after the accident, when the pupil of the right eye was twice as large as that of the left; she said that it had been still more dilated at first. It did not contract on exposure to light; there was confusion of vision.

If sight may be thus injured or lost by wounds of the frontal nerve, we should infer that similar consequences would arise from injuries of the infra-orbital nerve. BEER says that this is the case, but he does not cite any facts.* The latter nerve, however, is so much more effectually protected than the former, that wounds of it are comparatively rare.

Wounds of the lacrymal apparatus.—The lacrymal canals and sac are so small, so protected by their situation in the corner of the eye, and by the surrounding bone, that they seldom suffer from external violence; if they should be injured, we can do nothing more than keep the parts at rest, and employ the local and general treatment most likely to avert inflammation. I have seen one of the lacrymal canals, and its corresponding punctum, obliterated by accidental injury without any observable defect in the absorption of the tears. Even where this has happened to the lower canal, and the nasal half of the eye-lid has been at the same time drawn down and partially everted, the person has suffered no inconvenience from watering of the eye.

I have seen three or four instances of the lacrymal sac being burst by a blow, with escape of air into the cellular texture of the lids; the emphysematous swelling, which has been considerable, but not extending beyond the palpebræ, has disappeared spontaneously in a few days.

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* *Lehre*, vol. i. § 205.

Penetrating wounds of the orbit.—When wounds occur within the margin of the orbit, their depth is of more consequence than their extent; indeed, the smaller are the more dangerous, as a small pointed instrument is more likely than a larger one to penetrate into the cavity. Here the external wound affords no criterion of the internal injury and danger. A slender and sharp instrument my easily pierce the bony roof of the orbit, which is as thin as paper at some points, and thus wound the brain. Some of the muscles or nerves, contained in the cavity, may be divided or injured, the position of the globe being consequently changed, and its motions more or less affected.

Lastly, the entrance of a foreign body into the orbit often displaces the globe, pushing it out between the palpebræ, where it remains in the state technically termed exophthalmia. It is thus protruded by pressure of the thumb at the external angle in the practice of gouging, which is still allowed in fighting, in some parts of the country, where the people are unenlightened and semi-barbarous. The globe itself escapes injury from its spherical figure; it can hardly be wounded, except on its anterior surface.

All penetrating wounds of the orbit are to be regarded as serious cases, when we do not know how far the injury has extended, and should be treated accordingly until the period of danger is passed. The patient should be kept quiet and should not employ the eye; the bowels ought to be emptied and a light diet enjoined, the symptoms being carefully watched, so that the earliest indications of danger may be noticed and properly treated.

Protrusion of the globe; exophthalmia.—If the globe should have been thrust out between the lids, the nerve is rendered insensible. We should ascertain whether any foreign substance remains in the orbit, and remove it if there be any such. The globe is then to be gently replaced; it returns easily and remains in its situation. If the latter should not be the case, it must be retained by a soft, folded, linen rag, dipped in water and confined by a light bandage. Rest of the eyes, and of the body generally, and antiphlogistic treatment with spare diet, will be proper. Vision is soon restored in these cases, if the globe should have been merely thrust between the lids; such a displacement involves no considerable stretching of the nerve. BEER* mentions the case of a young man, who had received a blow on the external angle of the eye by a tobacco-pipe, violently thrust in his face by a fellow-student. When BEER came, there was complete exophthalmia, and the cornea was turned towards the nose. He found, and extracted from the orbit, a piece of the pipe, nearly an inch long, when the globe returned of itself into the cavity, the cornea still remaining turned inwards, and the patient having a very feeble perception of light. In five weeks vision was perfectly restored, but the eye was still directed towards the nose, and could scarcely be moved in the opposite direction, probably from injury to the external straight muscle.

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* *Lehre*, vol. i. § 167.

Cases of exopthalmia from accident are recorded, in which replacement of the globe has not been effected for some days, or even weeks, but has been ultimately accomplished, with restoration of vision when there has been simple protrusion, without any other injury.

If the muscles and nerves should be extensively wounded, the globe will be very loose, and entirely insensible to light, and will fall out of the orbit again after being replaced. It should be restored, and gently confined in its situation.

Conjunctiva.—Slight injuries of the conjunctiva, by the end of a finger or the edge of a hat, the wounds of scarification, or in removing a pterygium, are unimportant, and require only the simplest treatment.

Wounds of the globe.—Its delicate organization, vascular and nervous structure, and great sensibility, render it very liable to inflammation; consequently wounds inflicted on it are dangerous. Surgical operations, which are executed with the sharpest and smoothest instruments, and performed with the greatest care and gentleness on persons carefully prepared by previous attention to diet and medicine, often excite serious inflammation; we cannot therefore be surprised at the violent and destructive disturbance caused by wounds made with rough, ragged, or blunt bodies, inflicted with violence, and on subjects in a state of body favourable to inflammation.

The extent of the wound, the degree of violence, and the state of the constitution, are the circumstances of chief importance in determining the degree of inflammatory re-action. Small wounds gently inflicted are not dangerous; such as the wound of the cornea in kerato-nyxis, and in the evacuation of the aqueus humor, and the puncture of the tunics in depression. Larger wounds, when gently inflicted, often cause no inflammation, as the section of the cornea in extraction. The very smallest, when violent, are attended with great danger, from laceration of the delicately organised parts, and concussion of the nervous structure. I saw complete amaurosis caused by a single small shot, which struck the sclerotic obliquely and did not enter. The state of health at the time of the occurrence is, however, in most cases, a matter of more consequence than the extent or manner of the injury: in an individual of full habit, or one whose circulation is habitually excited by indulgence in the enjoyments of the table, or whose health is disturbed by disorder of the digestive functions, the smallest injury will excite considerable inflammation; while under opposite circumstances we are sometimes surprised to see how much violence is inflicted with impunity on this delicate organization.

In consequence of the serious inflammation they so often excite, inflammation affecting the interior of the organ, penetrating wounds of the globe, that is such as pass through the cornea or sclerotica, must always be deemed important cases. The patient should remain quiet, and the wounded organ must be kept perfectly at rest; the alimentary canal should be effectually cleared, and low diet strictly enjoined. If the individual be young and robust, or of full habit, or if, from any other circumstances, considerable inflammation may be expected, a full bleeding from the arm should immediately take place; supposing the propriety of this treatment to be doubtful, it will be safer to bleed than to omit it. In a child, leeches should be applied to the eye-lids; from four to ten or twelve. If blood should not be taken immediately after the accident, the patient must be closely watched, and bleeding, cupping on the temple, or leeching be resorted to, as soon as pain comes on in the part. The cupping or leeches must be repeated until all uneasy sensation shall have subsided.

Extraneous substances are to be removed, if there should be any such in the wound. This rule, however, is not absolute. The point of a cataract knife was broken off in the operation, and remained in the anterior chamber, from which it soon disappeared without any injurious consequence to the organ. I have seen this take place, and think it better to leave a minute particle of steel in the anterior chamber, than to persevere in attempts at removing it, if it should not come out easily.

Cornea.—I saw considerable uneasiness, which lasted for two or three days, from a small and just perceptible scratch of the cornea, by the sharp finger nail of an infant.

Walther mentions, in his interesting tract on hypopyon, the numerous cases of that affection, which occur every year in Bavaria, during harvest, in consequence of wounds of the cornea. The reapers, who pursue their occupation with the body bent forwards, often receive injuries in the eye from the ears or blades of the corn. They are robust men, and generally predisposed to inflammation by their laborious exertions under a hot sun, and the fuller diet and greater supply of beer and brandy which they are enabled to procure at that time. The injury, in general, is merely a slight scratch of the cornea. They pursue their labours, and eat and drink as usual, either neglecting the eye, or irritating it by some popular and inappropriate remedy. In the early part of the season patients were seen with small abscesses of the cornea; then they came with matter in the anterior chamber; and after a still longer time, others presented themselves with the cornea destroyed by suppuration, with the chambers full of matter, or the globe burst. Walther found that in the Isar district alone from fifty to sixty eyes are annually lost in this way during the harvest.*

Wounds of the cornea produced by particles of metal, or other minute substances, cause very different degrees of inflammation in different individuals. In some cases there is neither local disturbance nor uneasiness; at least nothing more than mechanical irritation on motion; while in others, where the person is of full habit, or continues laborious exertion, especially under exposure to heat, and combined with free drinking, severe inflammation of the cornea, sclerotica, and anterior chamber generally, with hypopyon, may be the result. When such inflammation begins, a pink zone is first seen in the sclerotic, round the cornea; this redness becomes deeper and more extensive; the cornea loses its transparency, often becoming quite dull and turbid; it ulcerates round the foreign particle, which is loosened and drops out. This state will require vigorous antiphlogistic measures, and unless they are of decided character, and actively pursued, suppuration of the cornea, and extension of inflammation to the chambers of the aqueus humor, will result. When the cornea is penetrated, the aqueus humor escapes, the cornea and iris coming into contact; but this fluid is soon re-produced, and the corneal wound unites by adhesion. When the wound is large, prolapsus of the iris often follows; the portion which

* *Merkwürdige heilung eines eiterauges*, &c., second edition, p. 25—27.

thus escapes cannot be replaced; we can therefore only treat the case on the general principles already explained. I shall more particularly consider prolapsus iridis afterwards.

Sclerotica.—Wounds of the sclerotica are not of consequence in themselves, but they become important from the force which must have been required to effect them, and from the almost inevitable participation of the immediately adjoining internal tunics. A violent blow sometimes bursts the sclerotic coat, without dividing the conjunctiva; the hard external covering of the eye is cracked by the injury, and we see the fissure of the sclerotic through the conjunctiva. Concussion of the retina, internal extravasation of blood, and amaurosis, are the almost invariable concomitants of such an injury. The prognosis, therefore, is doubtful, if not absolutely unfavourable in such cases. The result is sometimes more fortunate than we anticipate.

In the month of February, 1829, a boy, ten years old, was brought to me from a distance of fourteen or fifteen miles within three or four hours after meeting with a wound of the eye. It had been inflicted by a wooden arrow, armed with an iron nail, which being square, had been ground to a point, not very sharp. It had been thrown against the eye, not shot from a bow. The sclerotica was punctured just where the needle is entered in couching; there were two small divisions of the membrane, meeting at an obtuse angle. The schoolmaster, who accompanied the patient, informed me that immediately after the accident the pupil had been largely dilated, and that the boy could not see. I found the pupil still dilated, and vision very confused. I directed antiphlogistic treatment, with rest; and, suspecting either that the retina had suffered by concussion, or that inflammation of the internal tunics, would ensue, I gave a very unfavourable opinion of the probable result. When I saw the patient again, at the end of a fortnight, I found that he had been kept on low diet in a darkened room, and that leeches had been applied once. There had been no inflammation, nor pain. The pupil was of its natural size, the iris acted perfectly, and vision was good. There was a small transparent vesicle in the situation of the wound. I saw the case again in another fortnight, when vision was perfect: the vesicle remained.

Wounds of the sclerotic do not unite; the fissure in the cases just described, is permanent, and the punctured opening made in depression of the cataract is equally so.

Iris.—A wound of the iris is generally an important case; it is a penetrating wound, and usually inflicted with violence. A simple division of this part is, however, in itself unimportant. Although the iris, when examined microscopically after a successful minute injection, seems to be entirely composed of a vascular net-work, it does not bleed on being cut, nor does a simple division of it lead to any injurious consequences. On the other hand, it is greatly irritated by pressure. In the natural state it is unconfined, freely moving in the aqueus humor; in the condition of prolapsus, the hard edge of the cornea embraces and presses on the neck of the prolapsed portion, while the external tumor is constantly undergoing friction from the eye-lids; thus irritation is produced, which often extends to the whole globe, greatly aggravating the sufferings of the patient.

Accidental violence may cause detachment of the iris at its ciliary margin, thus producing an artificial pupil; according to the extent of the detachment it may cause, either an alteration of figure in the natural pupil, a diminution, or complete closure of it. This kind of accident is accompanied with effusion of blood into the anterior chamber.

CASE.—JOHN O'BRIAN, forty years of age, a blacksmith, of robust frame and accustomed to live freely, was admitted into St. Bartholomew's, under my care, on the 1st of December, 1830. Two days before, as he was breaking an iron rod with a large hammer, a portion of it about an inch long was detached, and struck him a violent blow in the eye. He experienced great pain in the part after the accident, but was relieved by keeping in bed the following day, applying fomentations, and taking salts, which acted briskly. I found the globe pushed forwards, the conjunctival and sclerotic vessels distended; the anterior chamber more than half full of blood; the iris detached from the corpus ciliare, at the upper and outer part, to the extent of three lines, so as to form an artificial pupil of elliptical figure; no pain, nor intolerance of light; incomplete amaurosis, so that the divisions of a window or a hand held near to the eye could be seen, although the letters even of large print could not be distinguished. I ordered a large venesection, an active purge, cold lotion to the eye, confinement to bed, and low diet. Dec. 2. Fifty ounces of blood were taken, and the bowels were freely opened. The patient slept well, and feels much better to-day. The vascularity of the eye is diminished; vision is improved; the pulse is eighty, and soft; the tongue moist and clean. 3rd.

Progressive improvement. The natural pupil has assumed an oval shape from the falling down of the detached portion of the iris. The blood is completely removed from the anterior chamber. 6th. Some pain, with slight lacrymation and intolerance of light: the vascularity of the conjunctiva is increased. Ten ounces of blood from the temple by cupping. 10th. He feels the eye quite well; the vision is much improved, though not so good as before the accident. The protrusion of the globe has disappeared, and the iris has nearly resumed its natural situation. He left the hospital a few days afterwards. I saw this person in the spring of the present year (1832). His vision was good, and the separation of the iris was marked by a very narrow fissure, which could only be detected by close inspection.

17th CASE.—A boy, ten years of age, came under my care at St. Bartholomew's on the ~~21st~~ of July, 1831, in consequence of injury to the right eye from a blow with a small whip. He was brought to the hospital two hours after the accident, when the anterior chamber was filled with blood, and there was some redness of the eye. Twelve leeches were applied, and the antiphlogistic treatment was adopted in other respects. The blood had nearly disappeared on the evening of the 20th. On the 21st the vascularity of the globe had increased, and the anterior chamber was again filled with blood. (Twelve leeches; aperient medicine.) 22nd. Twelve leeches; absorption proceeding rapidly. 23rd. The effused blood entirely absorbed and vision perfect. He was kept in the hospital till the 1st of August, and was then discharged quite well.

Discolouration of the iris or aqueus humor? with slight concussion of the retina from a blow.—On the 7th of January, 1828, a gentleman received a severe blow on the left eye from a piece of wood projected forcibly by the sudden explosion of a firework: he paid but little attention to the circumstance, which did not prevent him from joining in the festivities of the occasion—the celebration of a birth-day. He merely used some lotion and took a purgative on the following day, although sight was impaired, and a globe of red appeared before the eye. Finding that he grew worse instead of better, he returned to town, where I saw him on the 11th. There was ecchymosis of the conjunctiva scleroticæ in its whole extent. The iris, which is naturally blue, was of a bright yellow, or rather yellowish green; the pupil just like the other, and moving with it. No pain in the eye or head. No increased vascularity of the conjunctiva;

no inflammation, either of it, the cornea, or the iris. No inflammation of the sclerotica, which was carefully examined on account of the ecchymosis of the conjunctiva. He could see objects and recognize persons, but could not read ordinary print. (Cupping on the left temple; active aperients; light diet, with exclusion of fermented liquors; rest of the eye.) 14th. Cupping repeated; two grains of calomel night and morning. 26th. The calomel has been continued to this day, with occasional aperients, rest, and low diet. The mouth has not been affected in the slightest degree. The discolouration of the iris has gradually disappeared, and it moves just as well as the other. He can read the smallest print with ease, and is sensible merely of a slight dimness, as if he looked through a thin fog. The ecchymosed blood is nearly absorbed from the conjunctiva. September, 1828. The appearance of the eye is natural; vision is nearly, if not quite perfect.

Was the cause of the phenomena, in this case, a change in the iris, in the aqueus humor, or in the cornea? Mr. WARDROP, to whom I mentioned the case, said that he had seen the occurrence, and had evacuated the aqueus homor, when the natural appearance of the iris returned. The only circumstance which renders this explanation doubtful, is, that the chamber cleared first at the centre, and then gradually towards the circumference. When the principal portion of the iris had appeared of its natural colour for some days, a little yellowness was still visible towards each angle of the eye. In a similar case, which I saw in St. Bartholomew's, the discolouration disappeared spontaneously.

Wounds of the choroid and ciliary body—Hemorrhage.—If a penetrating wound of the globe takes place behind the cornea, the ciliary body or choroid coat will probably suffer; wounds of those parts will be attended with extravasation of blood into the chambers of the eye, both anterior and posterior. It has been recommended to open the anterior chamber in order to let out the coagulated blood, and prevent further effusion. This is totally unnecessary, since absorption is very active in this chamber, and the blood will be removed in a few days. I have seen it disappear in twenty-four hours. Such a wound in the cornea is not only altogether unnecessary, but must be injurious, by adding to the local injury, already considerable, and by increasing the chances of inflammation by the exposure of the chambers. The blood does not mix with, or render turbid the aqueus humor, but it sinks to the bottom of the anterior chamber and there remains, and in two instances I found that it retained its fluidity, so that the level was altered on inclining the head to one side; but whether this is always the case I do not know. This effusion of blood into the anterior chamber is not in itself a matter of consequence; but it shows that injury has been done to the ciliary body or choroid. We sometimes see effusion of blood behind the iris; altering the colour of the pupil and making it visibly red in a good light; this must always be regarded as a very unfavourable appearance, indicating that the injury extends to the central and most important parts of the eye. Rest, cold applications, and antiphlogistic treatment are proper where blood has been effused either before or behind the iris. After it had been speedily and completely absorbed under such management, I have seen a renewal of effusion in consequence of premature exertion.

When the ciliary body, or choroid coat, is wounded, the pupil exhibits a remarkable change, which must be referred to the partial injury of the ciliary nerves necessarily attendant on such an accident. As these nerves, which supply the iris, run between the sclerotic coat and choroid, they must suffer when those tunics are injured. Thus the iris is partially paralysed, the portion supplied by the injured nerves being contracted to the utmost, and sometimes even disappearing, and the pupil exhibiting a corresponding partial dilatation.

The *lens and its capsule* are frequently injured, when the cornea and iris are punctured by sharp instruments. As the wound is penetrating, and necessarily inflicted with more or less violence, the case is always important. We find invariably that the lens becomes opaque when it or its capsule is wounded, and the slightest mechanical injury is sufficient to produce that effect, such as a puncture of the part with the finest needle. By introducing such a needle through the centre of the cornea and the pupil, cataract might be artificially produced without any other injury to the organ, without inflammation, and possibly without any appearances from which the manœuvre could be discovered. It has been said, that soldiers have had recourse to this proceeding in order to obtain their discharge from the army. We cannot explain how or why wounds of the lens and capsule should thus invariably produce cataract.* We can trace no vessels into the lens from its capsule; its ordinary nutrition is a problem to us, and we are equally in the dark respecting its changes from accident or disease. The alteration in question is independent of inflammation; for it will occur before inflammation comes on, or even when it does not take place at all.

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* From trials on animals, made by Dr. Dieterich, it seems probable that the statement in the text, respecting the invariable occurrence of cataract after wounds of the lens and capsule, is not correct. He instituted an extensive series

Traumatic cataract, as it is technically called, takes place under various circumstances; 1st. Simple puncture of the lens through the cornea and the pupil; 2dly. Laceration of the capsule, with protrusion through the opening of the exterior

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of experiments on dogs, in competition for a prize offered by the medical faculty of Tubingen, and published the results as his inaugural dissertation, in 1824: of this there is a copious abstract in the *Archives Générales de Médecine*, October, 1826. He wounded the anterior portion of the crystalline capsule, with a cataract needle, in various manners, thirty-six times. Opacity of the lens followed in one case only, probably from its having been unintentionally wounded. The capsule also retained its complete transparency, and the wounds in it healed, even when it had been divided transversely, without leaving a cicatrix.

He punctured the posterior portion of the capsule seven times; lenticular cataract resulted only in one instance: but the last-mentioned effect took place in eleven out of twelve experiments of incision of the capsule. Wounds of the posterior capsule were not followed by opacity of that membrane. The punctures healed with difficulty, and incisions did not unite at all.

In seventeen experiments the anterior portion of the lens was punctured. No visible change occurred in the eye in twelve of these; in three, lenticular cataract occurred; and in two violent internal ophthalmia. Of nine instances, in which incision was made into the anterior part of the lens, four were not followed by any morbid change, while in the five others, where the wounds were deeper, cataract ensued. Superficial injuries of the lens, on its posterior surface, were not followed by cataract. Such wounds, whether of the anterior or posterior part, when not accompanied with displacement, produced no change in the eye. In a few days they were completely healed. Wounds extending to the centre of the lens were constantly followed by cataract, iritis, and inflammation of the globe. Of eleven experiments, in which the lens was displaced, three were not followed by cataract, while in the others opacity of the crystalline and violent internal ophthalmia ensued.

What I have said in the text respecting the effect of wounds on the lens and capsule, has been deduced from the observation of such injuries in the human subject. Hitherto I have found no reason to alter the statement; nor have I seen in man that union of wounds of the capsule, which Dieterich observed so uniformly in his experiments on animals.

Since the preceding remarks were written, I have found in the *Handbuch* of Professor Rosas, analogous observations on the experiments of Dieterich. "The results," says he, "of my experience in the human subject have led me to draw opposite conclusions to those which Dieterich deduced from his experiments on animals. I have seen many cases in which capsulo-lenticular cataract has proceeded from inconsiderable wounds of the anterior capsule, although immediately subjected to antiphlogistic treatment. I remember two instances in particular, which occurred in the time of Beer: the anterior capsule was slightly wounded in puncturing the cornea to evacuate the aqueus humor, and cataract followed in both. I have since seen the same result repeatedly from accidental wounds, both in healthy and diseased eyes."—vol. i. § 421.

soft substance of the lens, in the form of a bluish white jelly;[*] a portion of this jelly may drop off into the anterior chamber, and be succeeded by a fresh protrusion. 3dly. Puncture or laceration of the capsule, with dislocation of the lens, which may press against the iris, or be wedged into the pupil, or push the iris into close contact with the cornea. 4thly. Passage of the entire lens through the opening of the capsule and the pupil; it may pass in the same way into the anterior chamber, still surrounded by its capsule. 5thly. Either of the above circumstances may be combined with wound of the cornea, or of the ciliary body, or with wound or prolapsus of the iris. When the lens is dislocated, and presses against the iris, great irritation and severe inflammation ensue. 6thly. The lens may become opaque, in consequence of a blow or

[*] Dr. Dieterich[*] noticed the appearance of a white flocculent substance on the wounds of the capsule in his experiments, in which it soon disappeared by absorption. He observes that this may proceed from the aqua Morgagni, from the exterior semi-fluid stratum of the crystalline, or from the effusion of coagulable lymph; and he is in favour of the first explanation. Mr. Watson[†] ascribes the appearance in question to the "effusion of semi-transparent albuminous matter." Mr. Wardrop[‡] has given a good figure of it in his ninth plate, over which he has placed the following description, "Albumen effused from a wound of the capsule of the lens.' In his description of the plate, he speaks of it as a protrusion of the lenticular substance. "An opaque white matter, resembling a flake of snow, extends from the lens, which is also opaque, through the pupil, and comes nearly in contact with the cornea." "It is probable," he adds, "that in this case, the bristle had penetrated not only the cornea, but also the capsule of the lens, thus allowing the thinner parts of the lens to come through the wound into the anterior chamber.

Having repeatedly observed and carefully inspected these protrusions of bluish white gelatinous substance, not only in accidental injuries of the capsule, but also in wounds made in operations for cataract, I feel quite satisfied that the explanation of the appearance given in the text is the true one. In the human subject it occurs only in conjunction with opacity of the lens, and the flocculent matter protruding through the wound of the capsule is continuous with the opaque lens. In colour and consistence it perfectly resembles the fragments of lens, which are sometimes seen in the anterior chamber after operations for cataract, while it is totally different, in these respects, from any of the effusions of lymph which are seen in this part of the eye. Lastly, it may take place when no inflammation whatever has occurred in the chambers of the eye; and Dieterich, who mentions it as a consequence of puncturing the capsule, expressly states that the capsule never inflames after such punctures. I never saw lymph effused from the surface of the crystalline capsule under any circumstances.

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[*] *Archives*; vol. xii. p. 299.

[†] *Edinb. Med. and Surg. Journal*; v. 26, p. 265, fig. 3. *Compendium of the Diseases of the Human Eye*; p. 126, pl. viii. fig. 4.

[‡] *Essays*; v. ii. pl. ix. p. 254.

concussion of the eye, without any solution of continuity. I have seen many such instances.

In a patient who had received a violent blow on the eye from the fist, seen by BEER in twenty-four hours after the accident, the capsule was torn, the lens split in two, and quite opaque; there was slight effusion of blood into the anterior chamber, and considerable ecchymosis of the conjunctiva.[*]

Mr. BILLARD saw a patient brought to the Hópital de la Pitié for a wound of the eye from a blow of the fist. The lower part of the cornea was lacerated, and the crystalline, which had escaped through the opening, was found in the patient's pocket handkerchief. [†]

The lens has not only been displaced by a blow, but forced through the external proper tunics, so as to lie under the conjunctiva. It has escaped on puncturing the tumor caused by its presence: vision was lost. [‡]

When the lens has been rendered opaque by wounds, under any of these circumstances, it begins to be absorbed, and this process of absorption will go on in many cases to the complete removal of the opaque body, leaving the pupil entirely clear, so that the wound is both the cause and the remedy of the cataract. That portion of lens that may be squeezed through the opening in the capsule into the anterior chamber undergoes absorption very readily, while that which remains within the capsule is absorbed much more slowly. When the lens has been thus removed, a membranous cataract is generally left. In almost all cases of penetrating wounds, considerable inflammation supervenes, in which the capsule participates, being rendered opaque and sometimes thickened, so that when the lens is quite absorbed, a membranous or capsular cataract is seen occupying more or less of the pupil, and sometimes completely filling the opening. The iris is involved in the inflammation, and hence arise adhesions of the pupil.

The treatment of these cases, immediately after the accident, must be managed according to the general rules applicable to penetrating wounds of the globe; we must institute the antiphlogistic plan without delay, and follow it up actively, either until inflammation shall be removed, or the period for its recurrence shall have gone by. It will be right to dilate the pupil by the use of belladonna, and thus expose the lens more freely to the action of the aqueus humor, in order to facilitate its absorption. When the eye has acquired its natural state, excepting the presence of the opaque body in the pupil, the treatment falls under the rules applicable to cataract, which will be considered hereafter.

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[*] *Lehre*, vol. i. p. 218, note.

[†] The French translation of my lectures, under the title, "*Traité Pratique*," &c. p. 158, note.

[‡] *Edmonston's treatise*, p. 195. *London Medical Gazette*, vol. ix. p. 178.

The opaque capsule does not undergo absorption like the lens; it will remain in the pupil unchanged for any number of years. I doubt whether it is ever absorbed. Beer mentions a case in which the lens had been in the anterior chamber for twenty-six years unreduced in size.[*] It had been displaced by a violent blow upon the eye. A patient occasionally visited the London Ophthalmic Infirmary, with the lens surrounded by its capsule in the anterior chamber, where it had been twenty-eight years.

When the dislocated lens has passed into the anterior chamber, it acts as a foreign body, irritating the surrounding parts, causing inflammation of the eye, and severe pain in the organ, brow and head. The inflammation and pain which continue in spite of antiphlogistic treatment, may be most speedily and effectually relieved by removing the irritating cause; that is, by extracting the dislocated lens through an opening made in the cornea with a cataract knife. Sight is not usually restored, the retina having suffered by the original injury, or, in conjunction with the iris and internal parts generally, from the inflammation consequent on the accident. The dislocated and injured lens may remain behind the iris, being pushed against it, or protruded into the pupil, and against the cornea. Serious internal inflammation and great pain commonly ensue. Here extraction of the lens is strongly recommended by Mr. Barton,[†] of Manchester, as the best way, when performed early, of preventing the inflammatory and painful consequences of the injury, or of removing them when it has been delayed to a later period. The result, as regards vision, is rendered doubtful here by the same circumstances as in the preceding case. The removal of the lens, which is usually soft, and sometimes broken up, is accomplished in these cases by a smaller incision than that of extraction. It will be sufficient to divide the cornea in one-fourth, or one-sixth of its circumference: the lens sometimes escapes on the knife, or it may be removed with the scoop.

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[*] *Lehre*, vol. i. 220, note.

[†] *On the treatment of certain injuries of the eye*, in the *London Medical Gazette*, vol. v. p. 784. *Report on the advantages of extracting the lens in severe injuries of the eye*, by Mr. R. T. Hunt, *North of England Medical and Surgical Journal*, vol. i. p. 481: it contains the details of nine cases. In the *London Medical Gazette*, vol. ix. p. 1—4, five cases of dislocated lens are reported by Mr. Mackenzie. Extraction was performed with great advantage in three.

It must be a serious injury to reach the vitreus humor, and occasion any loss of it; we may expect as the result, not only blindness, but change of figure in the globe. The escape of this humor in the operation of extraction will be considered under the head of cataract.

Retina.—A simple puncture of the *retina* is not attended with any danger; in fact, this membrane must be frequently wounded in the operation of depression, yet such punctures do not impair its powers; a larger division will cause amaurosis.

The kind of violence most injurious to the retina, is the concussion which it suffers from a blow on the eye, and the danger is in a direct ratio to the degree of force. The affection of this membrane, as evinced by the diminution, or loss of sight, is not commensurate with the amount of injury to the organ. The nervous structure of the eye suffers in these cases, as the brain does in many injuries of the head; and the term *concussion* would be equally applicable to both. The employment of this word does not exclude the notion of actual laceration, or vascular rupture in either case; we merely employ it to denote the accidents in which, although the symptoms show the brain or retina to be affected, there is no external wound. When the sclerotic is ruptured, there is either actual laceration, or concussion of the retina; but the latter kind of injury sometimes occurs from accidents of a more trivial character, in which the degree of violence appears too inconsiderable for the effect. This injurious influence on the retina is only produced by blows on the naked globe; the interposition of the eye-lids is sufficient to protect the eye even from great violence, as the pugilistic contests teach us. The diminution, or loss of sight, is immediately consequent on the accident, and usually accompanied with a fixed state of the pupil, perhaps with some enlargement or change of figure in the opening, and with excessive partial dilatation, where the ciliary nerves are divided or contused. There may be effusion of blood into the anterior chamber, or behind the pupil. When we first see such a case, we should inquire minutely into the circumstances of the accident; ascertain the nature, degree, and exact situation of the injury; observe the condition of the iris and the pupil, and satisfy ourselves clearly respecting the state of vision. We shall thus be prepared to speak decidedly, not only on the present state of vision, but on the important question of its ultimate loss or recovery. If there be mere concussion of the retina, without other injury of the globe, and if sight be only partially injured, recovery may be expected under prudent management; that is, if the patient and the organ be kept in repose, and the access of inflammation be prevented. Total amaurosis immediately following the injury, is a most unfavourable symptom under any circumstances; the addition of considerable change in the pupil, extravasation of blood, and indications of actual laceration of the retina, make the case absolutely hopeless. Under the latter unfavourable circumstances, there is, at the time of the accident, no great pain in the part, nor increased redness, but in a few days the eye becomes painful, and grows red; the pain increases, inflammation commences in the internal tunics, and spreads to the exterior, the sclerotic and conjunctiva becoming red, with pain in the head, intolerance of light, increased lacrymal discharge. The necessity of antiphlogistic treatment is obvious. As the violent symptoms subside, the eye goes into a state of atrophy, the globe becomes soft, diminishes in size, and shrinks into the orbit.

This concussion of the retina, and consequent blindness, sometimes take place from accidents, that we should hardly deem adequate to produce such an effect. I was consulted in the case of a young gentleman in the country, who had merely struck the eye with a pocket knife, when cutting a piece of whipcord; the blade of the knife, which was quite blunt, wounded the lower part of the cornea. The lad was treated very judiciously; the practitioner on the spot applied leeches, and did all that could be done in such a case, but when the eye was opened, after a certain time, the friends were alarmed to find that the patient could not see; and he was consequently brought to town. The pupil was dilated and fixed, but not discoloured. The wound seemed to have penetrated the cornea and reached the iris, which adhered to the cicatrix, but it had not extended to the lens; the eye, however, was quite insensible to light. I considered the eye to be lost, and indeed it did not appear to me that any thing could be done. As the parents of the child were very anxious about him, a consultation was held on the case, which terminated in the same opinion. After three or four months, he was brought again to town, when the process of absorption had not only begun, but considerably advanced, so that the bulk of the globe was already considerably reduced.

Not long ago, I had occasion to see another lad from the country, who had received a blow upon the eye with a small stick from one of his companions. It appeared that the eye had been struck on its inner side, but although the injury had produced at the time no visible mark, or external redness, amaurosis followed, and was permanent. After the lapse of a few weeks, the sight of the other eye became impaired sympathetically, and I was afraid that it would be entirely lost; the retina, however, recovered. The influence of one eye upon the other is not confined to cases of disease. When an eye has been lost by accident, the other often becomes diseased sooner or later, without any imprudence, or any external influence that would be injurious under ordinary circumstances. This kind of occurrence is so common, that it is necessary to warn those who have lost an eye of their danger, and to point out the necessary precautions for avoiding it. For this affection of the sound eye, if it is not noticed and properly treated in the early stage, often destroys sight. Its most common form is slow inflammation, which may affect the iris, the retina, or the internal tunics generally. Rest of the eye, antiphlogistic means, and the use of mercury, are the principal points of treatment.

Our only chance for restoring sight, when the retina has been injured by concussion, is in keeping the organ quiet, in taking blood from the neighbourhood by cupping or leeches, and in the general treatment called antiphlogistic. After evacuations, blistering may be resorted to advantageously. A boy about six years old was brought to the London Ophthalmic Infirmary, with injury of the eye from the explosion of gunpowder. There was a small extravasation of blood into the anterior chamber, some enlargement of the pupil, which was motionless, and apparently displaced towards the upper part of the eye, and loss of vision. The prognosis was unfavourable; but sight was perfectly restored, the change of figure in the pupil remaining.

I subjoin the following cases to illustrate the nature, treatment, and prognosis of the amaurosis consequent on blows inflicted on the eye, the shrinking of the globe consequent on internal inflammation after such accidents, and the sympathetic effects produced on the other eye.

Incomplete amaurosis of the left eye from concussion of the retina; same affection of the right from chronic internal inflammation.—A gentleman, thirty-eight years of age, whom I saw in January 1829, had lost the sight of the left eye from a blow on the front of the organ with a stick, nine years previously. The right eye began to fail four years ago; he employed no treatment, and was nearly blind with that eye. The pupil of the left eye is large, fixed, and irregular in figure, the iris having contracted to its utmost on the nasal side. He can discern large objects with this eye, but cannot make out even capital letters. The pupil of the right eye is contracted and partially adherent; vision is about the same as on the other side.

Amaurosis nearly complete from a blow.—A boy, eight years old, was struck in the eye with a cricket-bat; there was great swelling of the lids. Leeches and other suitable means were employed. When I saw him some weeks after the accident, all the immediate effects of the injury had disappeared. The pupil was dilated, and capital letters could not be distinguished.

Inflammation and complete amaurosis from a blow.—A boy twelve years old, whom I saw in April 1828, had been struck on the eye, four weeks previously, by a stone thrown by a companion in play. He was running away, and was struck as he looked round to see whether his pursuer was reaching him; the blow must therefore have been oblique. Sight was impaired, but there were no external appearances of inflammation; and the proper means were employed to prevent its occurrence. There came on, in a few days, pain and redness of the eye, with pain in the head, and comatous symptoms, for which active treatment was necessary. When I saw the patient, there was external redness from fulness of the sclerotic vessels, extreme dilatation of the pupil, and complete amaurosis. A small opaque mark observed on the cornea, near its margin, towards the external angle of the eye, was supposed to be the effect of the injury. The other eye had not suffered.

Partial amaurosis from concussion of the retina; partial recovery.—A boy, eight years old, received, on the 8th of May, 1828, a violent contusion of the right eye from falling against the end of the handle of a cricket-bat, which was placed perpendicularly. The accident was followed by great swelling of the lids and surrounding parts, and severe pain. Proper treatment was adopted; and when the subsidence of the swelling allowed the eye to be examined, there was no evidence of direct injury to the globe; but the boy said that he was blind. I saw him on the 20th of June, when I found a scar on the under lid, evincing that the accident had been serious. The pupil was dilated, not fully; and vision was very imperfect, but the patient's age did not allow the kind and degree of imperfection to be exactly appreciated. I prescribed the hydrarg. c. creta, with mild aperients, and a succession of blisters. On the 26th of July vision had much improved; the small capitals in the title-page of an octavo book could be readily distinguished. Partial dilatation of the pupil remains. As this patient, who lived between twenty and thirty miles from London, was not brought to me again, I think it probable that sight was restored.

Amaurosis from concussion of the retina; internal inflammation; recovery.—A youth of eighteen received a blow on the cornea, of which a mark remained. The symptoms were slight redness of the sclerotica, discolouration of the iris, dilatation of the pupil, which had assumed an oblong figure, and amaurosis nearly complete. Leeches, which were applied three times, aperients, low diet, and repose of the affected organ, were the means employed, under which the patient got well in a month, the colour and motions of the iris, the figure of the pupil, and the sensibility of the retina being completely restored.

Atrophy of the globe from a penetrating wound.—In October 1827, I saw a child in arms, in whom the eye-ball had been wounded by a fork three months previously. The cornea was not more than one-fourth of the natural size, and the globe was quite flaccid.

Atrophy of both globes.—A healthy boy, seven or eight years of age, was brought to me in June 1829, with complete atrophy of both globes. There was in each a clear cornea, about the size and figure of a barleycorn placed horizontally. About fifteen months before, one eye had been lost by a penetrating wound. Internal inflammation came on in the other, which seemed to have been incautiously worked. This was stopped, and vision was restored; but the eye was again inconsiderately used, and inflammation returned. Afterwards the globe shrunk.

Shrinking of the left eye from a wound; subsequent loss of the right by internal inflammation.—A person near seventy, who had been accustomed to exert the eyes considerably, in working in metal, received a wound of the left cornea in January 1831, from a particle of metal. It was followed by violent inflammation, suppuration of the globe, and collapse of the tunics. The inflammation subsided in about six weeks. Soon after the right eye become inflamed, with diminution of sight. Under active treatment vision was improved, but not completely restored, and he had not been able to resume his occupation. I saw the patient in September, four or five days after the relapse of the inflammation. There was external redness, particularly round the cornea, which was somewhat nebulous in its lower half; the pupil contracted and irregular in figure; pain over the brow, vision very imperfect; he could see the hand, but could not distinguish whether the fingers were open. In spite of active treatment, by cupping, leeching, blistering, and salivation, maintained for some weeks, the inflammation proceeded, accompanied with severe pain, and vision was completely lost.

Atrophy from penetrating wound; internal inflammation, and cataract of the other eye.—A boy ten years old had lost one eye from a wound of the globe, followed by atrophy. Slow internal inflammation occurred in the other, and produced change of colour in the iris, opacity of the lens and capsule, and general adhesion of the pupil. The operation for cataract was performed, the lens was quite soft, nearly fluid. The pupil became clear, but vision was not improved.

Atrophy of the right eye; iritis in the left.—In December 1826, I was consulted by a gentleman, who had received a wound of the right cornea, six or eight years before. The eye was now flaccid; the iris altered in colour and texture, and the pupil obliterated. A violent attack of iritis had occurred in the left eye; it had been arrested by antiphlogistic means and mercury; and then relapsed. The eye was now slowly recovering.

CHAPTER VII.

CATARRHAL OPHTHALMIA.

Synonymes: *Conjunctivitis catarrhalis. Conjunctivitis puro-mucosa atmospherica,* Mackenzie.

The distinct nature of this affection, and its origin from atmospheric causes or peculiarities, are denoted in the terms *cold* or *blight*, under which it is often popularly mentioned; while the expression *ophthalmia mucosa*, designates the increased mucous discharge, which is one of its most striking characters. It is inflammation of the conjunctiva, either of the globe or of the lids, or of both, caused by cold, and it corresponds to catarrhal affections of other mucous membranes, as those of the nose and its sinuses, of the fauces, trachea, and lungs. Catarrhal inflammation frequently goes through all these parts, and commonly so in influenzas.

Causes.—I do not use the term *cold* in the sense of diminished temperature, but to denote what is commonly called catching, or taking cold, i. e. an injurious influence of cold or moisture applied to the surface, exciting disease, either in the system generally, in the part chilled or wetted, or in some distant part of the body. What is the nature of this influence? and how are the effects produced? Every body knows the effect, because every body has experienced it; but the cause, or rather the chain of causes, connecting the external agency of cold or wet on the skin, with the production of morbid phenomena in a distant part, seems equally unknown to the ignorant and the learned. Why should mucous membranes so frequently suffer from this particular influence? Some of them are constantly and freely exposed to the atmosphere, and therefore directly influenced by its changes and peculiarities; such are the Schneiderian membrane, that of the fauces, mouth, trachea, and lungs, and these are accordingly most susceptible of such influences. The mucous membrane of the eye is open externally, yet the whole surface is not so completely and constantly exposed to atmospherical contact as that of the membranes just enumerated. Catarrhal inflammation of the eye, therefore, is second in point of frequency. All mucous membranes are connected by continuity of surface with the skin, which probably explains why they suffer so frequently from causes acting merely on the latter. The conjunctiva is a part of the external superficies of our frame, and its connexion with the common integuments is more extensive in proportion to its entire expanse, than in the case of any other mucous membrane.

Direct exposure of the part to cold and wet is the most frequent and powerful cause of catarrhal inflammation; exposure to cold winds, especially if combined with fog, rain, snow, or sleet. Particular winds are more capable than others of producing this effect, independently of the actual degree of cold; such is the case with east and north winds in this country. In individuals predisposed to the affection, being out in an east wind for a quarter of an hour, or half an hour, will sometimes infallibly bring on an attack. Length of exposure without exercise favours the action of the cause; hence soldiers and sailors on watch, or in camp, very often suffer. Great changes in the atmosphere from heat to cold, within a short period, bring on catarrhal affections. These vicissitudes are most common in hot climates, where the burning heat of day is succeeded by a chilly night air, often combined with heavy dews, to which persons frequently expose themselves by sleeping in the open air. Officers, being less exposed than soldiers, suffer less under such circumstances. Change of clothing, and consequent chill of the surface, especially in variable climates; partial exposure to cold air, or, in common language, to drafts of air; and the application of moisture in partial or general wetting, which most effectually chills the body, are other modes of the same unwholesome influence. The application of these causes to the head, or in the immediate neighbourhood of the eye, will most probably bring on catarrhal ophthalmia, when aided by original constitutional peculiarity, or by the general remote causes of disease. Atmospherical influences, of which the nature is entirely unknown, will operate powerfully on the mucous membranes, producing epidemic influenzas; but in these the conjunctiva merely suffers with the other mucous membranes: we have no epidemic ophthalmiæ extending over large districts, kingdoms, and even continents.

Catarrhal ophthalmia is seated in the conjunctiva, seldom going deeper, and therefore not dangerous; it may be confined to the lids, or may affect the globe also. The continental writers call the former *blepharo-conjunctivitis catarrhalis*, and the latter, *ophthalmo-conjunctivitis catarrhalis*.

Symptoms of catarrhal ophthalmia.—Stiffness and smarting, some uneasiness on exposure to light, watering, and external redness usher in the attack. When fully developed, it is characterized by redness, and increased *mucous* not *lacrymal* discharge: the pain is inconsiderable, and there is no intolerance of light.

The redness in catarrhal inflammation is superficial and of bright scarlet colour, forming a striking contrast to the rose or pink tint, which belongs to inflammation seated in the proper external coat of the eye. The distended vessels are quite superficial, and of scarlet colour; they may be readily pushed aside by moving the lids. The redness is generally irregular, in patches, some fasciculi of vessels being more filled than others; hence the membrane has a mottled appearance: however, in the fullest development of this affection, the whole surface becomes of a bright red. The redness begins at the circumference of the globe, and gradually advances towards the cornea: but in the commencement it is confined to the palpebral conjunctiva, or to the angle of reflection. Sometimes, besides the redness resulting from vascular congestion, especially if the inflammation be severe, we see red patches in the conjunctiva; these are spots of ecchymosis, small quantities of extravasated blood, and such an appearance denotes activity of the inflammation. Sometimes there are little vesicles, called pustules, on the conjunctiva, slight elevations of the membrane, containing a serous fluid, and usually appearing about the margin of the cornea.

Catarrhal inflammation seldom produces much swelling of the conjunctiva, nothing like the state of chemosis, which presents itself in the inflammation before described. The only approach to such an appearance is a loose serous effusion, raising the mucous membrane from the sclerotica.

The pain in the commencement of the affection is not considerable, except in severe cases, the patient complaining rather of a stiffness, dryness, or sensation as if sand or gravel had got into the eye. The intolerance of light is slight at first, and after a time the patient hardly complains of uneasiness, and opens the eye freely to the light even when there is considerable redness. The feeling as if a foreign body were in the eye, which is commonly experienced in conjunctival inflammation, appears to be produced by the partial vascular distention, and consequent inequality of surface and mechanical irritation on motion. When we take off the fulness of the vessels by bleeding the sensation subsides.

When the lacrymal discharge observed in the very commencement stops, its place is supplied by increased secretion of mucus from the inflamed membrane itself; this is at first thin, and as the inflammation goes through certain changes, it becomes thicker, assuming a whitish or yellowish appearance, and sometimes putting on a character approximating to that of pus. This increased mucous discharge distinguishes the catarrhal form of inflammation. Its quantity will depend on the degree and extent of inflammation. It may be just sufficient to collect in small quantity at the corners of the eye; a whitish streak may be seen on the inside of the lower lid at the angle of reflection; there may be enough to form more or less copious incrustations about the cilia, and agglutinate the edges of the lids at night, or it may constitute a copious muco-purulent discharge, hardly distinguishable from that of mild purulent ophthalmia. The eye-lids participate, more or less, whenever there is a marked attack of catarrhal inflammation in the eye.

Other mucous membranes suffer when there is a severe attack of this inflammation; hence pain and sense of weight about the frontal sinuses and antrum. Under such circumstances there is more or less of catarrhal fever, chills, heat, headache, disordered stomach, and foul tongue, with impaired appetite or sickness. Such a state of stomach may cause an inflammation of the conjunctiva, bearing all the marks of catarrhal character, without any atmospherical influence. The symptoms of catarrhal ophthalmia, both local and general, remit by day, and undergo exacerbation at night. During day the redness is less, there is no pain, nor intolerance of light; the eyes become sore and uneasy in the evening, smarting and burning, with increased redness and mucous secretion.

Termination and prognosis.—The affection is seated in and originally confined to the mucous membrane; it passes through a certain course and then subsides; it yields readily to treatment, and therefore, generally speaking, is free from danger. If the inflammation be violent, and either totally neglected or improperly treated, it may extend to the sclerotica and cornea, causing ulceration and opacity of the latter, and thus seriously injuring the organ. The affection is still manageable, if no mischief has actually occurred to the cornea.

I subjoin the following case to exemplify the characters and treatment of a case, simply catarrhal, but rather severe.

J. C., fifty-six years of age, of full habit, was seen on the 4th of July, 1826, with inflammation of the right eye, which had commenced the day before. The symptoms were, general bright scarlet redness of the eye-ball, deep red colour of the palpebral conjunctiva, with some thickening of the ciliary margins and mucous secretion on them, a little mucus lying in the fold between the lower eye-lid and the globe, pain in the eye and head, but no intolerance of light. The case of a boy, who was seen at the same time with inflammation of the sclerotica consequent on injury of the cornea, presented a striking contrast to the preceding description. In the latter, the redness was pink, with quite a violet or dilute claret tint; in the former, bright scarlet: the sclerotica was the seat of this colour in one, the conjunctiva in the other. The vessels were large and superficial in the former; small, and covered by the conjunctiva, in the latter: the redness covered the whole globe in one; it was confined to the neighbourhood of the cornea in the other. There was no uneasiness on exposure to light where the whole eye-ball was of a bright scarlet; great sensibility to light, with copious lacrymation, in the other case where the redness was comparatively trifling. The treatment consisted of venesection to sixteen ounces, purging, abstinence from meat and fermented liquor, and saturnine lotion. On the 8th the patient was nearly well. This patient came again on the 13th with a relapse. There was acute catarrhal inflammation of both eyes, with foul tongue. (Venesection to sixteen ounces, to be followed by an emetic of ipecacuanha and tartrite of antimony, and an aperient the next morning. Saturnine lotion. 15th, Pain gone; considerable redness and mucous secretion. A blister to the nape; one dram of magnes. sulph. in the infus. ros. every six hours. Saturnine lotion. Cerat. cetacei to the eye-lids.) 18th, The patient is free from complaint, but the redness is not quite gone. 22nd, No trace of disorder is left.

Diagnosis.—Its catarrhal origin, the diurnal remission and nocturnal exacerbation of the symptoms, the absence of pain and intolerance of light, even when there is great general redness, the bright red tint of the membrane and of the distended vessels, and the superficial position of the latter, the natural state of the sclerotica and its vessels, and the mucous discharge, distinguish it from common inflammation of the external tunics. It must, however, be remembered, that from the same exposure to cold, which causes inflammation of the conjunctiva, the sclerotica also may suffer; that the affection, which is then called *catarrhal-rheumatic ophthalmia* by some writers, is more dangerous under such circumstances; and that the symptoms differ in important points, being those described in the account of inflammation affecting the external proper tunics. From purulent ophthalmia it is distinguished by its much milder character, as will be understood better when that affection is described. Yet the characters of the two affections approximate, particularly when we compare the severest catarrhal with the mildest purulent inflammation. On the whole, the difference is rather in degree than in kind; unless it should be established, which it is not at present, that the latter always is, and the former always is not contagious.

Treatment.—Catarrhal inflammation of the eye requires antiphlogistic treatment; but, as the affection is not a serious one, and does not produce injurious consequences to the organ, mild measures will be found sufficient. Venesection is not in general necessary; but in a young subject of full habit, with catarrhal inflammation in both eyes, and that severe, a full blood-letting would be proper; in ordinary cases, cupping and leeching will suffice. The bowels should be freely evacuated by an active aperient, or, if the tongue be foul, an emetic may advantageously follow the loss of blood. Saline sudorific medicines may then be given, such as the liquor ammoniæ acetatis, with nitre, or tartrite of antimony, and occasional purgatives. The patient should be kept warm, taking plentifully of warm diluent drinks, and no animal food, nor fermented liquor. If blood should have been taken by venesection or cupping in the morning, and the alimentary canal should have been subsequently cleared by an emetic and a purgative, the warm bath, or warm pediluvium may be used at night, and a full dose of Dover's powder (from ten to twenty grains) given at bed-time. The patient will be nearly recovered the next day, or it may be necessary to repeat cupping or leeches, to persevere in low diet, diaphoretics, and purgatives for a few days, and perhaps to apply a blister to the nape. In cases where the inflammatory affection is not considerable, and seems entirely referable to a disordered state of the alimentary canal, it may not be necessary to take blood from the part. An emetic, and an active aperient containing calomel, or the latter alone, may be administered, and followed by mild purgatives, the diet being light.

The best local application in these cases is warm water, or poppy fomentation; these are better than cold lotions in catarrhal inflammation. The Germans are anxious to prevent the application of cold and moisture to the eye, when labouring under catarrhal inflammation; they think that cold, which has originally caused, must aggravate the disorder, and hence they are very particular in their directions to use every thing warm, and to dry the surface carefully afterwards. However, patients often find cold washes comfortable, and they are certainly not injurious. The sticking of the lids together during the night, may be prevented by inserting a little mild ointment between the tarsal edges in the evening; a little fresh butter, a bit of lard, or the spermaceti ointment, will answer the purpose. After employing these means until the inflammation has somewhat given way, we may resort to counter-irritation by blisters; but the other treatment which I have recommended, will in most cases put a stop to the inflammation.

Catarrhal ophthalmia, especially when the inflammation does not extend beyond the mucous membrane, is one of the cases to which the use of strong astringents is more particularly applicable. In the opinion of those who have tried it extensively, this local treatment may advantageously supersede the general means, particularly loss of blood. Mr. Melin proposed the employment of a strong astringent in the very commencement of the affection, as a means of cutting it short, and preventing the development of the inflammation. He adopted this proceeding in ordinary conjunctival inflammation, having considered that acute ophthalmia was in general treated too actively, and that a mere local disorder could not require such extensive depletion as was usually practised and recommended. He was further induced to try the practice, from having witnessed the good effects of a solution of lunar caustic, in some cases of gonorrhœa, both in allaying the pain and suppressing the discharge. The strength of the solution employed was four grains to the ounce of distilled water, which was dropped into the eyes twice a day; it excited pain and a sensation of roughness, with an increased flow of tears for about twenty minutes, after which the eyes felt much relieved, and in a few days the cure was effected. "Since that period," says Mr. Melin, "I have treated nearly three hundred cases of acute ophthalmia, some of them of a severe nature, in a similar manner, without either local or general bleeding, and I have had ample opportunities of proving its efficacy."[*] Mr. Bacot informs us that this plan of treating ophthalmia originated with Dr. Ridgway, who uses a solution of lunar caustic, in the proportion of ten grains to the ounce, and has employed it in gonorrhœal as well as in common conjunctival inflammation.[†]

Mr. Mackenzie trusts to simple treatment, chiefly by local stimuli, which he saw employed with great advantage by Beer, in 1817. He uses a solution of nitrate of silver, containing from two to four grains in the ounce, and applies to the eye a large drop once a day. He foments the eye thrice daily with a collyrium of one grain of corrosive sublimate in eight ounces of water, lukewarm. And he applies to the edges of the lids at night a small portion of ointment containing one grain and a-half of red precipitate to the dram.[‡] "I have treated," says Mr. Mackenzie, "many hundred cases of catarrhal ophthalmia according to the plan above detailed, and with uniform success. In almost no case, (indeed, I may say in no case in which struma did not modify the symptoms,) in which the above simple remedies were had recourse to previously to ulcer or opacity of the cornea, did any ulcer or opacity ever occur; nor did the symptoms ever fail speedily to subside."

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[*] *Report of ocular diseases at the general hospital, Fort Pitt; London Medical and Physical Journal*, vol. liii. p. 184.

[†] *Treatise on Syphilis*, p. 136—140.

[‡] *Practical Treatise*, p. 334, 335.

MR. GUTHRIE uses his ten grain nitrate of silver ointment, see p. 123.

It is not necessary to cover or shade the eye, unless as a protection from strong light, if it should be offensive; when the common pasteboard, covered with green silk, may be used. We generally find that cool air is pleasant to the feelings of the patient; that it will remove the sensation of sand in the eye. It is not necessary to confine the patient to the house unless the weather be cold, windy, or rainy. Free exposure to a mild atmosphere is advantageous.

When catarrhal ophthalmia has been violent and long continued, more especially when there have been repeated attacks, the palpebral conjunctiva undergoes change of structure, becoming thickened, and exhibiting on its surface the elevations called granulations. For a more particular account of this change, and its treatment, I must refer to CHAPTER IX. on *purulent ophthalmia*. EBLE* has observed, that the lower eye-lid suffers most in catarrhal ophthalmia, and that the granulations take place rather in the conjunctival folds between the lid and the globe, than on the lid itself.

Catarrhal inflammation of the eye-lids† begins with soreness, smarting, burning, and dryness of their margins, which become red, swelled, and painful, often acutely so; the angles are generally affected first, or principally; they may suffer alone, or the whole margin may be inflamed. The palpebral conjunctiva is found at the time to be red, uniformly vascular, and perhaps villous. Great uneasiness is experienced on motion, with a sense of stiffness or dryness, and the feeling of a foreign body in the eye; hence, in an acute attack, the lids are kept closed and quiet. Employment of the eye, as in reading or writing, particularly before the fire, and exposure to light, bring on pain, with profuse lacrymation. A mucous discharge soon takes place from the inflamed membrane, and the pain is then succeeded by itching. The Meibomian

* *Ueber den Bau und die krankheiten der Bindehaut*, § 75, 76. pl. iii. fig. 13.

† BEER calls this affection *blephar-ophthalmitis glandulosa idiopathica*; that is, idiopathic inflammation of the glands of the eye-lids. *Lehre*, vol. i. p. 284. It appears to me that the mucous membrane is the primary seat of disease, and that the Meibomian glands, if diseased at all, are affected secondarily.

glands participate in the affection, which begins on the ciliary margin of the lids, in the thin and delicate skin perforated by the ducts of these glands, which are themselves imbedded in the inflamed membrane. They no longer pour out the mild unctuous matter, which usually smears and softens the edges of the lids, but their secretion is suspended, so that in the morning the ciliary margins are stuck together by the increased conjunctival discharge, which has become incrusted by the evaporation of its watery part during the night. In this way the lids are often so firmly agglutinated as to require long bathing with warm water before they can be parted. When the Meibomian secretion is renewed, it is altered in quality, being viscid, and thus assisting in causing the palpebræ to stick together. This morbid secretion, spread over the cornea, affects its polish and transparency, as glass is rendered dull by extraneous impurities; hence vision is impaired, and often considerably, alarming patients for their sight, and making them ask for something to clear it. Hence frequent attempts are made to clear the cornea by moving the lids; hence, too, when vision becomes worse in the evening exacerbation of the symptoms, rings, haloes, and irides, are seen round the candle, or its flame splits into stars. At the same time the uneasiness, smarting, or itching, the stiffness, redness, and mucous secretion, are increased.

The ciliary margins lose their cuticular covering, become actually excoriated and raw, with further changes of the Meibomian and conjunctival secretions. These irritate the lids and excoriate them externally, particularly towards the angles, and the lower lid more especially, which is often entirely deprived of its cuticle, and even ulcerated. This, which is the chronic form of the complaint, and called *lippitudo*, often lasts for many weeks, months, or even years; recurring on the application of slight causes, whether external or internal; often originating insensibly and advancing slowly, without any marked acute stage; leading to thickening of the lids, especially of the mucous lining of the lower, and consequent ectropium of that lid, and to loss of the cilia. The affection commonly begins, and is usually most conspicuous towards the angles of the eye: hence the expression, *lippitudo angularis*.

Causes.—Catarrhal affections of the lids are frequent, and easily explicable; beginning in the ciliary margin, where the thin and vascular membrane is necessarily and constantly exposed to atmospheric influence, and to the irritation of unhealthy secretions lodging and incrusting about the eye. According to BEER, catarrhal inflammation of the lids appears occasionally at Vienna, almost in an epidemic form, under the prevalence of cold drying winds at a particular season of the year.* Although we do not see cases here in such abundance as he speaks of, they occur in so much greater number in cold and wet weather, particularly in the long prevalence of cold winds, as to indicate their atmospherical origin.

But inflammation of the lids, *(ophthalmia tarsi,)* not essentially distinguishable from the catarrhal, is often produced by other causes; by any irritation applied to the ciliary margin, especially in persons of fair complexion, thin skin, and what is called a lax fibre. Thus it may be caused by residence in close confined air and smoky apartments; by sitting up at night in close chambers; by confinement indoors; by much employment of the organ by candle-light; by exposure of it to vapour, smoke, and other irritants. The operation of such causes is aided and increased by neglect of personal cleanliness, indulgence in fermented liquors, particularly of the stronger kind, by other imprudences in regimen, and by inattention to the state of the bowels. Hence it is common in nurses, washerwomen, and many of the middling and lower classes, becoming at last, from long exposure to the exciting causes, inveterate and habitual.

The treatment, in the acute or incipient stage, must be of a mild antiphlogistic character. Leeches to the lids, tepid lotions, mild ointments, and active aperients at first, and afterwards alteratives and mild purgatives. It might be necessary to take blood from the temples by cupping, and the repetition of leeches is often required. Blisters may be afterwards used. The organ must be rested, and the exciting causes removed.

In the chronic stage, astringents and stimulants are not only advantageous but necessary. Scarification is most applicable to this form of complaint; the lid should be inverted, and the shoulder of the lancet drawn along at a single stroke, from one end to the other. The vinum opii, and the metallic salts in solution may be employed; but the greatest benefit is derived from stimulating ointments applied to the ciliary margins of the lids. When thus used, they correct the Meibomian secretion, and relieve the patient from the very troublesome agglutination of the lids. The unguentum hydrargyri nitratis, or citrine ointment, is the best of these. Having gently melted it in the flame of a candle, take up a little of it with a small camel-hair pencil, and draw it once along the edge of each lid; you may previously, if the organ be not too irritable, put a small drop of the vinum opii into the eye. The red precipitate ointment (ung. hydrarg. nitrico oxydi) is used in the same way. If the patient, or an ordinary attendant, should apply either of these, their strength should be reduced one half or two thirds.* The ointment of JANIN, so often recommended by SCARPA, and other foreign writers, is a mixture of Armenian bole and tutty, of each ʒij., white precipitate ʒj., and lard ℥ss. The active ingredient in SINGLETON'S, or the golden ointment, is stated by Dr. PARIS† to be orpiment *(auripigmentum, sulphuret of arsenic.)* These stimulating local applications must not be used in an early period of the complaint; they would infallibly aggravate the inflammation and the patient's sufferings; nor must they be used when the eye is inflamed, however long the affection may have lasted, and however indisputable its title to the epithet chronic. The antiphlogistic treatment must precede in such a case. If our stimuli irritate, they must of course be laid aside.

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* *Lehre*, vol. i. p. 301.

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* The red precipitate ointment of the London Pharmacopœia, containing one dram of the precipitate to one ounce of the vehicle, is too strong for the eyes. Mr. MACKENZIE allows only twelve grains to the ounce, increasing it in some cases to twenty.—*Practical Treatise*, p. 138. JUENGKEN considers from one to two grains to two drams of ointment strong enough, when it is to be introduced into the eye; from one to two grains may be added, when it is used to the lids only.—*Lehre von den augenkrankheiten*, p. 936.

The German writers direct the red precipitate to be mixed with fresh butter, which is unfit for the purpose from its soft consistence, and soon turning rancid. JUENGKEN advises a mixture of hog's lard with wax, similar to that directed by the London Pharmacopœia.—*Ibid.* p. 903.

† *Pharmacologia*, vol. ii. p. 99.

CHAPTER VIII.

PURULENT OPHTHALMIA—PURULENT OPHTHALMIA OF NEWLY-BORN INFANTS.

CATARRHAL ophthalmia forms a connecting link between common or simple, and purulent inflammation of the eye, in which the character of the conjunctiva as a mucous membrane is most strongly marked. Purulent ophthalmia is inflammation of the most acute kind, attended with an increased secretion, which in all its sensible properties, especially colour and consistence, so strongly resembles pus, that the name of the affection has been hence derived. This name is the best, being founded on the most obvious and striking character of the complaint; the term *Blennorrhœa*, derived from the Greek, and generally employed by the continental writers, is equivalent. *Ophthalmia mucosa* is a name already occasionally given to the catarrhal inflammation of the eye. *Suppurative* ophthalmia is an objectionable expression, because the discharge, although resembling pus in colour, is not the product of suppuration.

The affection begins in the linings of the lids, extends to the mucous surface of the globe; when violent and not checked, it soon attacks the cornea, which it either entirely disorganises, or so considerably changes in structure, as frequently either to destroy, or seriously injure, sight. The whole texture of the membrane swells, and becomes thicker; its vascular tissue is developed, the blood-vessels being distended to the highest degree, and the surface acquiring an intense bright red. The membrane is rendered villous, pulpy, granular, in short, like that which lines some parts of the alimentary canal; and from the secreting surface, thus developed, flows the puriform discharge: but this is a secretion, or rather an exhalation, and hence the epithet suppurative is inappropriate. Indeed this form of disease does not, like some others, produce suppuration of the eye. The changes in the cornea are sloughing, ulceration, and interstitial deposition, causing opacity. The sloughing and ulceration often expose the anterior chamber, causing prolapsus of the iris, and may, by giving rise to escape of the humours and collapse of the tunics, not only destroy the function, but also the very form of the eye.

Purulent ophthalmia is originally seated in and confined to the mucous membrane, and often goes through its course without extending further: if it goes deeper, it is by the propagation of inflammation through the medium of continuous textures, and especially by the progress of ulceration.

It attacks at all ages, and under all circumstances, and seems to be always essentially the same: yet there are modifications. I shall describe three forms of it, viz.

1. *Purulent Ophthalmia* of newly-born infants.
2. *Purulent Ophthalmia* after infancy.
3. *Acute Gonorrhœal Ophthalmia.*

The two first are unquestionably the same affection, distinguished only by circumstances arising out of the age of the patient. There are some peculiarities in the latter, referrible probably to the specific nature of the cause.

Purulent ophthalmia of infants.—This is the *purulent ophthalmia of newly-born infants; ophthalmia neonatorum;* the "*purulent eye*" of children of Mr. WARE. I do not know that any other person has used the latter term, and I see no good reason why it should be adopted, as the proper tunics of the eye are not necessarily involved in the affection. BEER* uses the name *blephar-ophthalmitis glandulosa* as if the disease had its origin or seat in the Meibomian glands. I am quite at a loss to account for such an opinion; though I do not doubt that the glands may be involved.

Symptoms and progress.—This inflammation is one of considerable consequence, and the more so from its commencing in a way not calculated to excite the attention, or alarm the fears, of the mother or nurse. The child cannot express its sensations, and the concomitant swelling conceals the progress of disease, so that serious mischief is often done before we see the patient. In the first place the inflammation is not immediately noticed, and in the second, the measures employed are frequently insufficient to check its progress: hence it causes more blindness than any other inflammatory disorder that happens to the eye; and the number of children is very considerable, whose sight is partially or completely destroyed by it. They are frequently brought to us with staphyloma, opacities of the cornea, and prolapsus of the iris; or with the tunics collapsed, and the very form of the eye destroyed. The parents and attendants are apt to suppose, when this inflammation first appears, that it is merely a cold in the eye, which will go off; and the consequences just mentioned take place, in many cases, before they are aware of the danger, and before they resort to surgical assistance.

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* *Lehre*, vol. i. § 304 and 323.

The inflammation commonly comes on about three days after birth, but it may take place at a later period. In the first stage, it is confined to the mucous lining of the palpebræ. It is observed that the lids stick together a little when the child wakes from sleep; their edges are redder than natural;* and especially at the corners; the child experiences pain from the access of light, and therefore keeps the eye closed. If the lids are inverted, their linings are found red and villous, and a little white mucus is seen on the inside of the lower. The globe is in a natural state. This first stage of the complaint is the *blepharo-blennorrhœa* of the nosologists; that is, purulent inflammation of the palpebral conjunctiva.

In the second stage, all the symptoms are increased; the inflammation extends from the conjunctiva of the lids to that covering the globe; the vascular congestion and redness are much augmented; the lids swell and become red even externally; there is a copious secretion of purulent fluid from the inflamed membrane, which agglutinates the edges of the palpebræ, and then accumulates between the lids, or pours over the face, staining the cap and linen. Exposure to light becomes very painful, and the child turns away its head and contracts its brow, keeping the eye constantly shut, even if the swelling of the lids should not close them. The case now becomes *ophthalmo-blennorrhœa.*

The inflammation, the redness, and the tumefaction of the conjunctiva, are carried to the highest pitch in the second stage of the complaint; the whole of the conjunctiva, lining both the palpebræ and globe, is swollen and of a uniform bright scarlet colour. The surface at the same time assumes a villous character, resembling in the latter respect, and in its colour, the appearance of the internal surface of the fœtal stomach, after a successful injection with size and vermilion. The close adhesion of the membrane to the tarsi, prevents the palpebral conjunctiva from swelling much; but the loose folds between the lid and the globe become greatly enlarged, forming red tumid rolls, finely granulated. These folds, pressed on by the orbicularis, evert the tarsi, causing ectropium of either or both lids. This eversion takes place when we attempt to examine the eye by separating the lids, or it will be produced even by crying. It is generally temporary, subsiding when the cause ceases to act; but it may be permanent.

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* Mons. Billard, in a note to his translation of my lectures, says, "external redness of the eye-lids often occurs at the outset of the inflammation. I have seen in infants a transverse red line on the eye-lid before the puriform secretion began. From this redness, Mons. Baron has often prognosticated, at the Foundling Hospital, the approaching attack of ophthalmia."—*Traité Pratique*, p. 160, note.

There is general, and often very considerable tumefaction of the lids from serous effusion into their cellular texture; they become red externally, and in cases of the severest inflammation, the upper lid presents a smooth convexity of bright red colour. When thus swollen, the upper lid hangs completely over the lower. The redness and swelling are increased by crying, when the whole globe is pushed forwards.

A profuse discharge takes place from the eye, and pours over the face of the child in crying, or when the lids are opened. The latter are agglutinated by the drying of the discharge, and then become distended with the puriform secretion, which issues in a stream on opening the eye. During the night the eye-lids become so firmly stuck together, that they must be carefully moistened and soaked with warm water, or milk and water, to open them. When they are separated, the eye is completely concealed by the discharge; we wipe it away with a soft rag, and there is still enough to cover the globe and hide the cornea, and ultimately we find the latter frequently covered by a kind of coagulated layer which must be removed by syringing. The discharge may be whitish, like the pus secreted by a healthy ulcer, and it then is generally small in quantity. More commonly it is yellow in various tints, and more copious; it is straw or lemon-coloured, or it stains linen yellow, like the yellowest gonorrhœal discharge. This yellow tint is very deep in unhealthy jaundiced children, sometimes being of a yellowish green. It may be thinner and of a reddish colour, that is, ichorous or sanious. Sometimes there is an admixture of actual blood.

Effects.—In this second stage, the inflammation has passed from the palpebral lining to the surface of the globe; the conjunctiva scleroticæ is found red, and it may be a little elevated by serous effusion. If the inflammation should continue, and not be checked by suitable treatment, it extends to the cornea, and thus may reach the interior of the globe.

Some one or more of the following changes are now produced.

1. *Sloughing* of the cornea, general or partial. When this change is about to take place, the cornea is at first whitish and dusky, then loses its polish and firmness of texture, being converted into a dirty greyish or brownish slough, in which the loss of vitality is immediately obvious; a line of separation takes place at the margin, and the dead part is soon cast off. The entire cornea may thus perish and separate, when the iris protrudes through the aperture, presenting an irregular dirty brownish prominence. Under such circumstances, the iris may either be nakedly exposed, and the humours escape, or it may be covered by a thin pellicle, by what is called the membrane of the aqueus humor. This, however, generally gives way, so as to lead ultimately to collapse of the globe. The separation of a partial slough leaves a whitish flocculent and ragged ulcer, which, unless its character be soon changed, speedily makes its way into the anterior chamber, and causes prolapsus iridis.

2. *Ulceration* may take place in the cornea, more or less considerable in extent or depth; it may affect nearly the whole surface, or it may penetrate the cornea, and lead to prolapsus iridis. The latter part may adhere to the ulcerated aperture, and the ulcerative process stop, or it may go on, and extend to the interior of the globe.

3. *Opacity* of the cornea from interstitial deposition, either into the texture of the corneal conjunctiva, causing a thin external bluish grey film, or into the corneal laminæ, producing dense total opacity. These changes may be confined to a small portion, or may affect the entire cornea.

4. *Adhesion* of the iris to the inflamed or ulcerated cornea. Such are the principal, more or less serious, visible alterations in the cornea, anterior chamber, and iris, which take place when severe purulent ophthalmia extends from the mucous membrane in which it commences to the globe; the last of these, however, although it occurs at this period, is not discoverable till afterwards, being concealed by the almost invariably concomitant opaque state of the cornea. These several diseased processes occur very quickly, and go on rapidly, as we might expect, *a priori*, from the great activity of the capillary circulation in infants, and the very acute character of the inflammation.

Examination of the eye is difficult from the swollen state of the lids, and the smallness of the palpebral aperture; but it is important, particularly in the first instance, that we should ascertain the exact state of the organ, the seat and extent of the mischief, and thus be enabled to form our prognosis. The painful impression of light causes the infant to resist any attempt at exposing the cornea, and the ectropium immediately produced by the forcible action of the orbicularis completely obstructs our view. The best and easiest mode of examining the eye of an infant is to open the lids while it is asleep; if the attempt be made lightly and gently, we generally succeed in obtaining a clear view of the cornea without awakening the patient. If it be awake, we should take the opportunity when it is quiet, and separate the lids quickly before the muscles can resist. If the child be crying when the attempt is made, it is scarcely possible to obtain a view of the cornea, on account of the violent contraction of the orbicularis; and the force uselessly employed in attempting to do so cannot but be injurious. In opening the lids, if the upper be raised by the skin merely, the action of the orbicularis will produce an eversion of the tarsus, and hinder us from seeing the cornea; but if the tarsus itself be pushed upwards and backwards the accident will be prevented. If the lid should be everted, it may be easily restored by drawing the tarsus gently downwards.

In the third stage of the complaint, there is a gradual abatement and cessation of all the symptoms; the redness, swelling, and discharge are diminished; the child bears the light better, and, when the increased discharge is removed, it opens the eyes spontaneously in the evening, or in a dull light. No ectropium takes place on crying, or when the eye is examined. We now see clearly the changes that have occurred under the active inflammation, and we have the opportunity of tracing the progress of these towards recovery.

When the entire cornea has sloughed, and the humours have been evacuated, the tunics collapse, and the globe shrinks to one-third of its original size, appearing as an opaque, somewhat flattened tubercle. If the humours have not escaped, the projecting iris recedes again, and becomes covered by an opaque pellicle, the front of the eye being flattened.

In the case of large sloughing, or extensive ulceration, the iris falls against the cornea, becomes adherent to it, and partial or general staphyloma ultimately ensues. If prolapsus iridis has taken place, through the opening caused by partial sloughing or ulceration, the brownish tumour gradually subsides, and at last disappears; we then see a small dark point in the cornea, surrounded with a white circle, which is the cicatrix of the corneal ulceration. The iris adheres firmly to the internal surface of the cornea at this part, and there is usually change of figure, with more or less contraction of the pupil. According to the situation and extent of these changes, vision may be either impaired or lost.

The ulcers of the cornea, while spreading, are of a dusky white, or yellowish colour, irregular in their surface, and often with a ragged edge; when they begin to heal, they have a greyish or bluish aspect, become smoother, have a soft gelatinous appearance from deposition of the substance which is to repair the breach, and red vessels pass to them from the conjunctiva, through the intervening transparent portion of the cornea. They heal, leaving a permanent opaque cicatrix: and this opacity will be of more or less importance as it is situated in front of the pupil, or at a distance from it.

Interstitial deposition into the texture of the cornea leaves permanent opacity of various extent and density. When it is dense, (*leucoma*, *albugo*,) and when consequently the cornea has been inflamed throughout, the inflammation will readily pass to the iris; that two inflamed parts brought into contact should adhere might be expected. This preternatural connexion is technically called *synechia anterior*.

No doubt in these cases the surfaces containing the aqueus humor are generally inflamed, and it is not uncommon to find a central opaque spot on the capsule of the lens, with the leucoma and synechia anterior: such an opacity may, however, be produced without the two other changes.

Superficial opacity caused by effusion into the corneal conjunctiva, and the slighter degrees of impaired transparency from interstitial deposition into the corneal laminæ, will disappear spontaneously, sooner or later.

In milder cases none of these consequences are produced; the tumefaction of the conjunctiva gradually subsides; the discharge is lessened, but in a whitish form it continues for some time, and the conjunctiva slowly returns to its healthy state.

When the complaint is severe, the infants suffer constitutionally; they become restless and debilitated; the tongue is white, and the bowels are irregular in the active stage. They become pale and feeble when sloughing has occurred.

Both eyes are usually affected, but the complaint does not commence in both at the same time: there is generally an interval of a few days.

Causes.—In a great proportion of cases there is vaginal discharge from the mother, leucorrhœa, and sometimes gonorrhœa. The eyes of the infant are exposed to the contact of these morbid secretions in passing through the vagina; hence has arisen the natural inference that they are affected from the actual contact of this matter, and the tolerably regular appearance of the disease on the third day corroborates this notion of contagious origin from direct application of the morbid matter.* I was acquainted with a case, in which a married gentleman contracted gonorrhœa, and communicated the disease to his wife then pregnant. The infant, which I did not see till four months after birth, had been affected with purulent ophthalmia; one of its eyes was staphylomatous, and the cornea of the other was considerably nebulous. The affection had been totally neglected, even the attendant accoucheur having stated that it was merely a cold in the eye, which would do well of itself. I have seen some cases of very rapidly destructive purulent ophthalmia in infants, when the mother has had gonorrhœa at the time of parturition. Sloughing of the cornea, with extensive ulceration spreading to the interior, and consequent evacuation of the globe, had occurred in these instances before I have seen them. An example of purulent ophthalmia in an infant, where the communication of gonorrhœa to the mother, and the infection of the child's eyes by the vaginal discharge were unequivocal, is related towards the end of this chapter. Although the inflammation was severe, it did not produce the serious effects just alluded to. But, on the other hand, purulent ophthalmia is often seen in the children of healthy mothers, at least, of such as appear perfectly healthy, and deny, when questioned, the existence of vaginal discharge in any shape. As we cannot carry the investigation further, the source of the complaint must remain at least doubtful in such cases, and consequently the contagious origin of the disorder is still open to dispute.

However we may settle the question of contagion, considered as the direct or exciting cause of purulent ophthalmia in infants, numerous facts show that certain circumstancés have a great influence in favouring its occurrence; so that, if the application of matter secreted in the vagina immediately excite the disorder in some, there are others in whom we can only trace the influence of ordinary causes, and we are thus led to conclude that the same kind of agencies, which produce other inflammations, may also excite this particular form. All the influences, which depress the system, are favourable to the appearance of purulent ophthalmia. It is most frequent and destructive in weakly children, in those who are most exposed to the various debilitating causes of bad air, cold, insufficient clothing, and deficient nutriment. Purulent ophthalmia is more frequent in premature infants, than in those born at full time; in twins than in single children. It is much more common among newly-born infants than in children; in children than in adults: it thus appears that as the powers of the system become more fully developed, the susceptibility to this complaint is lessened. It is more frequent in damp and cold, than in dry and warm weather, and among the children of the poor and necessitous, than in those of the higher classes. It is particularly prevalent, unmanageable, and destructive or injurious to the organ, in foundling hospitals, where infants are collected in great numbers, and deprived of what seems essential to their existence, the incessant care and watchfulness of the mother. I do not speak of such institutions as the foundling hospital of London, which does not receive infants; but of the foundling hospitals of Paris, Petersburgh, Moscow, and Vienna, which receive all the infants that are presented. The mortality in these establishments is enormous; the infants suffer from various diseases, and among them from purulent ophthalmia. It is of essential consequence to the well-being of the child at this tender age, that it should receive that constant attention and affectionate care, which a mother only can supply; although the institutions in question are admirably conducted, they can never make up for this deficiency. LANGENBECK observes that in the lying-in hospital of Vienna, where the women admitted are of the lowest class, and almost universally labouring under gonorrhœa or other vaginal discharge, but where the infants remain with their mothers, purulent ophthalmia is not common; while in the foundling hospital, where the children have not the advantage of maternal care, and where they are generally half dead from starvation and cold before they are received, the affection is very frequent.*

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* "I will not maintain," says SCHMIDT, "that the blepharo-blennorrhœa of those new born infants, whose mothers have leucorrhœa, is produced by direct contagion, like gonorrhœa; but I have ascertained clearly that in many such cases, discharge from the vagina exists in the mother. And I have further discovered, not unfrequently, in the case of female infants, that the mucous membrane of the female organs was affected as if they had a clap."—*Ophthalmologische Bibliothek*, v. ii. st. 2, p. 125.

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* *Neue Chir. Bibliothek*, vol. iii. p. 208.

Prognosis.—There is a singular contrast between the violence of this inflammation of the eyes in newly-born children, and the serious consequences to which that inflammation so rapidly leads, and the readiness with which it yields to suitable treatment. Hence, if we see a case of purulent ophthalmia before any injury is done to the cornea, we may assure the parents, and it gives us great pleasure to be able to do so, that sight will not suffer. If the inflammation be confined to the palpebræ, or even if it has extended to the globe, provided the cornea remains clear, it cannot be considered as attended with risk; for by the adoption of proper means, all injurious consequences to the organ will be averted; even the most violent form is very manageable, and will do well when properly treated. But if the disease has advanced so far, that the cornea has sloughed, or extensively ulcerated, loss of sight is unavoidable. Even if the cornea be of a dull white, or has begun to lose its transparency, injury or loss of vision is very probable; it is most likely that ulceration, prolapsus of the iris, or permanent opacity will follow. General superficial opacity from thickening of the corneal conjunctiva will disappear.

The appearance of the discharge affords some information; the whiter and the smaller in quantity, the lower is the degree of inflammation. The yellower and more copious the discharge, the more active is the disorder. If it should be thin, ichorous, or sanious, we conclude that sloughing has occurred, and that spreading and destructive ulceration is going on. The admixture of blood shows a violent degree of action in the part, but is not in itself dangerous, although it alarms the female attendants. It often relieves the overloaded vessels of the conjunctiva, and is thus attended with benefit to the organ.

Treatment.—In the most acute form of the disease, when the conjunctiva oculi is bright red, and swollen, more especially when the cornea has begun to look hazy; or if the palpebræ are much swollen and bright red, though we may not be able to see the eye itself, it will be necessary to take blood from the part by leeches. The superior palpebra is the best situation for the application; and a leech or two may be placed in the middle of the red swelling which it forms. From the vascularity of the skin leech-bites bleed very freely in these young subjects; a single leech thus applied will almost invariably remove the redness and swelling of the lid, and this favourable external change is attended with corresponding diminution of the conjunctival inflammation. I have seldom seen it necessary to use more than one leech, and even this sometimes renders the infant quite pale; in the most robust children I should not advise more than two, one to each lid, or one to the upper lid of each eye.

If the state of the cornea should be doubtful, with congestion still active in the conjunctiva, although the palpebræ should not be much swollen, it is better to apply the leech. On the occasions I have described saturnine lotion made with rose-water may be used. The bowels should be opened, and kept open by castor oil or magnesia; when the inflammation is active, with a white state of the tongue, a grain or two of calomel may be given previous to the administration of the purgative. The use of blisters has been recommended; but I am very cautious about employing them in infants and children; unless, therefore, such counter-irritation is absolutely necessary, I consider it better to be avoided. A physician of the lying-in hospital of Vienna recommends the constant application of cloths dipped in cold water, and uses no other means, external or internal. Knowing the violent nature of the inflammation, and the serious injury it is capable of producing, I should not feel contented to rely upon such a plan.

We must prevent the agglutination of the lids, and favour the ready escape of the discharge, by frequently bathing with tepid water or milk, and using a little lard or fresh butter; we do this, not because the discharge possesses the power which MR. WARE supposed it to have, of corroding or ulcerating the cornea; but in order to prevent irritation from distention of the lids, when glued together, and to obviate excoriation of them or the surrounding parts.

Having diminished the violence of the inflammation by the antiphlogistic means just described, we immediately proceed to employ astringents; I may observe, however, that the use of such applications is both safer and more advantageous in this form of ophthalmic inflammation than in any other. We generally use a simple solution of alum, in the proportion of two grains sometimes, generally of four grains, which may be gradually increased to ten grains, to the ounce of water. This solution is to be carefully injected between the palpebræ, so as to cleanse out all the purulent secretion, three or four times in the twenty-four hours; afterwards, a soft rag dipped in the same fluid may be laid over the eye for a short time. With the continued employment of this astringent solution, an occasional dose of some mild aperient may be combined; and usually nothing more is required. The swelling and redness of the membrane are lessened, the discharge abates, and the organ recovers its natural appearance, some congestion and thickening of the palpebral conjunctiva, and some increased mucous secretion often continuing for a considerable time. In the great majority of cases, and in all those where the conjunctiva oculi does not yet participate in the inflammation, the astringent may be employed at once. Such was the treatment in forty-nine cases out of fifty at the London Ophthalmic Infirmary; using no other means than magnesia internally, and the solution of alum locally; and out of many hundred instances, I hardly recollect one where the eye suffered in any respect, if the cornea was clear when the infant was first seen. When there is occasion to change the lotion, from the eye being accustomed to the stimulus of the alum, we may advantageously resort to the nitrate of silver, beginning with one or two grains to the ounce, and gradually increasing the strength to four or six grains. This solution may be dropped between the lids two or three times a day.

Mr. Ware, whom I should have mentioned, as having given the first express description of this complaint in our own, or I believe in any language, particularly recommends an astringent solution of rather complicated preparation and composition, called Bates's camphorated water. It may be made by pouring eight ounces of boiling water on eight grains of the sulphate of copper, the same quantity of Armenian bole, and two grains of camphor; let it stand till cold, and then pour off the clear liquor for a lotion. This composition has no superiority over the solution of sulphate of copper or alum; indeed, I consider the latter, and the lunar caustic, the best astringents, and a solution of them in distilled water the best form of the remedy.

The lotion used by Schmidt[*] was composed of zinci sulph. g. ij. liq. plumbi subacet. gtt. iij. spirit. vin. camph. gtt. xij. in aq. distill. ℥j.

Mr. Mackenzie[†] employs the collyrium of corrosive sublimate, (g. j. ad ℥viij.,) three or four times in the twenty-four hours. He applies once, or at most, twice a day, to the conjunctiva, previously cleared by the former collyrium, a solution of lunar caustic, (g. iv. ad ℥j.,) or sulphate of copper, (g. vj. ad ℥j.,) by means of a camel-hair pencil. And he prevents the adhesion of the lids during the night by smearing their edges at bed-time with the mild red precipitate ointment. (See p. 161.)

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[*] *Lib. cit.* p. 141.

[†] *Practical Treatise*, p. 363, 364.

MR. GUTHRIE* uses his nitrate of silver ointment, applying it with a brush all over the inside of the lids.

When the cornea has sloughed, the violence of the inflammation abates, being succeeded by an unhealthy and destructive ulcerative process, which, if unchecked, soon penetrates the cornea, and exposes the interior of the organ. The separation of the slough leaves a white flocculent ragged ulcer, in which there is no disposition to reparation. The constitutional symptoms undergo a corresponding change, the infant becoming pale, restless, irritable, and weak. Under these circumstances the powers of the system must be supported by tonics, of which bark is the best. The most convenient form for administering the remedy, is that of the resinous extract, which the infant will take easily, when broken down and blended with milk: from four to ten grains may be given in this way every four or six hours. It speedily renovates the powers of the system, and produces an equally beneficial local influence. The sulphate of quinine might also be employed, rubbed down with sugar. The solutions of alum and nitrate of silver may be used to the eye.

I relate the following case to illustrate some interesting points in the disease. A gentleman, under my care for gonorrhœa, communicated the disease to his wife, who had it severely. Although she used various means, the discharge continued, and was still copious when the infant was born, on the 12th day of the month. On the 15th, the infant's eyes, which had been remarked as very clear, strong, and beautiful immediately after birth, were observed to be rather gummy and sore, and they began to run on the next day. I saw it on the 21st, when there was inflammation of the conjunctiva, both palpebral and ocular, with bright redness, moderate swelling of the lids, and copious yellow discharge, (castor oil and alum lotion g. iij. ad ℥j.) It went on favourably, and I heard nothing more of the case till the 28th, when I saw the child under a great increase of the inflammation. The palpebræ were bright red, and so swollen, that it was difficult to get a view of the eyes. The left cornea was now so opaque, that I could not distinguish the colour of the iris; the right was also opaque throughout, but in a slighter degree. (One leech to each upper lid.) 29th. Much

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[*] *Lectures at the College of Surgeons*, in the *London Med. and Surg. Journal*, vol. i. p. 297.

relieved by the leeches, which caused free bleeding; the right cornea is clear. (One leech to the left upper lid.) 1st July. The left cornea is nearly clear. (Alum lotion; solution of lunar caustic g. ij—iij ad ℥j. dropped in once daily.) 19th. Both eyes are perfectly recovered.

Monsieur Billard* has mentioned, in his translation of my lectures, an instance of spontaneous recovery from opacities of the cornea, which had been considered hopeless. "At the foundling hospital of Paris I saw a child completely blind after purulent ophthalmia: the cornea was opaque throughout in both eyes. The child remained in the infirmary for a year, without any attention being paid to the eyes. The opacities gradually lessened, and sight was restored.

Purulent ophthalmia in children.—The foregoing observations, although directly referring to the purulent ophthalmia of newly-born children, are applicable to the treatment of the affection in those of one, two, or three years old, except that depletion must be more active. When the eye is bright red and painful, so as to prevent rest, two, three, or four leeches should be applied; one application is usually sufficient. Cold lotions are to be used; and purgatives of calomel with rhubarb or jalap, or followed by castor oil. In older subjects, up to the time of puberty, leeches suffice, as a means of depletion; they may be employed more freely in proportion as the patient is older, and should be quickly repeated if the symptoms are not checked. Active treatment by leeches, purgatives, and blisters cuts short the inflammation, and astringents finish the cure. I have, in a few instances of acute local congestion in a full habit, deemed cupping or venesection necessary before puberty.

Mr. Macgregor has given a very interesting account of the rise, progress, symptoms, and treatment of the purulent ophthalmia, which prevailed extensively for some years among the children of the Royal Military Asylum at Chelsea, where many hundred cases came under his notice. "A considerable degree of itching was first felt in the evening; this was succeeded by a sticking together of the eye-lids, principally complained of by the patient on waking in the morning. The eye-lids appeared fuller externally than they naturally are; and on examining their internal surface, this was found inflamed. In twenty-four or thirty hours after the appearance of the above-mentioned symptoms, a viscid mucous discharge took place from the internal surface of each eye-lid, and lodged at the inner canthus, till the quantity was sufficient to be pressed over the cheek by the motion of the eye. The inflammation then extended to the conjunctiva oculi, which became red, and raised, so as to form an elevated border round the cornea. This was often accompanied by redness of the skin round the eye, sometimes extending to a considerable distance.

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* *Traité Pratique*, p. 170, 171.

"The disease evidently began, and terminated, in the eyelids; and the surface of the eye-ball seemed only to be affected from its proximity; for they were often in a diseased state for weeks, nay even for months, after every symptom of the disease, in the membranes covering the eye-ball, had completely disappeared."

Mr. Maccregor employed general bleeding, leeching, saline aperients, reduced diet, cold lotions, and blisters behind the ears, or to the nape. After reducing the inflammation by these means, astringents were used with great advantage, particularly the solution of lunar caustic, from gr.ss. to g. ij. to the ounce. The ung. hydrarg. nitratis was found the most frequently successful of all the remedies that were employed. It was applied to the lids by means of a camel-hair pencil, at first mixed with. twice its quantity of lard, but afterwards of the full strength. The red precipitate ointment was useful when the citrine ointment had failed. The golden ointment was also used with advantage; but it was injurious if employed while the conjunctiva was inflamed and irritable. "The vinous tincture of opium, which has been so highly recommended of late years, was largely tried, but did by no means answer the expectations I had formed of it."

Mr. Maccregor observed, "that the disease is invariably more severe and protracted, in persons having red hair, and in such as are of a scrofulous habit, than in others. In proof of this I may mention that two-thirds of those who lost the sight of one eye, or both eyes, either had red hair, or had the glands of the neck enlarged, or had some other marks of scrofula existing in their habit."*

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* *Transactions of a Society for the Improvement of Medical and Chirurgical Knowledge*, vol. iii.

CHAPTER IX.

PURULENT OPHTHALMIA IN THE ADULT.

Synonymes: *Oph. purulenta*, or *puriformis*; *Egyptian oph.*; *suppurative ophthalmia*; *ophthalmo* and *blepharo-blennorrhœa*; *oph. contagiosa*; *epidemic-contagious oph.* ROSAS. *Conjunctivitis puro-mucosa contagiosa vel Egyptiaca.* MACKENZIE. *Oph. catarrhalis bellica*; *blepharotis glandularis contagiosa*; *adenitis palpebrarum contagiosa.*

PURULENT ophthalmia in subjects beyond the age of infancy is the same affection as that last described, only modified in its course, duration, and effects, by age; and requiring corresponding modifications in treatment. It is originally and essentially an affection of the mucous membrane of the eyelids; that is, inflammation with puriform discharge. It is often confined throughout to its original seat; more generally it extends to the conjunctiva oculi, when, if neglected or improperly treated, and sometimes in spite of all the means that can be employed, it reaches the globe itself, producing in the cornea and iris, injurious and destructive effects, similar to those which take place in newly-born children.

When we consider its marked character and serious consequences, it seems strange that it should so long have escaped notice. Yet our knowledge of it is subsequent to that more extensive intercourse with Egypt which took place during the contest for its possession between France and this country. I know of no clear description of the complaint previous to this epocha. SCARPA does not mention it in his first edition, bearing date 1801, and has only a single paragraph on it, an additional one, in his last or 5th edition of 1818. Mr. WARE does not allude to it, until long after the publications by the English army surgeons, subsequently to the evacuation of Egypt by our troops. RICHTER, who seems to have observed diseases of the eye with the greatest attention, for a long series of years, and who has described them with great fidelity, has not noticed this affection, which is not mentioned by BEER, nor by others of the Vienna school. BEER has entirely passed it over in his first edition of 1793: in the second edition of

1812-1816, he only alludes to it in a paragraph, in which he mentions that he had been long anxious to procure accurate information on the subject, and that his wishes had at last been gratified by a work of ASSALINI,[*] which had convinced him that the complaint was merely inflammation of the glands of the eye-lids, (*blephar-ophthalmitis glandulosa*, that is, catarrhal inflammation of the lids,) rendered violent by the peculiar local circumstances, and passing quickly, in consequence of the unsuitable treatment of the natives, and of the French and English army surgeons, into blepharo-blennorrhœa, and ophthalmo-blennorrhœa.[†]

The following circumstances will sufficiently prove the importance of the subject.

ASSALINI states, that two-thirds of the French army were affected with the complaint at one time.

Dr. VETCH informs us, in his interesting *Account of the ophthalmia, which has appeared in England since the return of the British army from Egypt*, that "the total strength of the second battalion of the 52nd was somewhat above seven hundred men; six hundred and thirty-six cases of ophthalmia, including relapses, were admitted into the hospital, from August 1805, when the disease commenced, till the same month in 1806; of these fifty were dismissed with the loss of both eyes, and forty with that of one." [‡]

The ophthalmia depôt, under the care of this able physician, contained in the summer of 1808, upwards of nine hundred cases from more than forty different corps.[§]

Cases of purulent ophthalmia had occurred in the 1st battalion of the 52nd, when it went to Sicily in 1806. It continued to suffer there. A part of the army of Sicily, which had been detached to Egypt brought back with it fresh infection. From this station more than one hundred and thirty cases were sent home totally blind.[‖]

"It appears from the returns of Chelsea and Kilmainham hospitals, that 2,317 soldiers were, on the 1st of December, 1810, a burthen upon the public from blindness in consequence of ophthalmia. Those soldiers, who have lost the sight of one eye, are not included in the number above stated."[¶]

In 1804, within nine months from April to December inclusive, nearly four hundred cases of purulent ophthalmia occurred at the Royal Military Asylum; and from that time to the end of 1810, upwards of nine hundred additional cases had taken place in the same establishment, without including relapses.[*]

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[*] *Observations sur la peste, l'ophthalmie d'Egypte*, &c. Paris; an. 9.

[†] *Lehre*, vol. i. p. 324.

[‡] p. 69.

[§] *Practical Treatise on Diseases of the Eye*, p. 184.

[‖] *Ibid.* p. 183.

[¶] P. MACGREGOR, in *an account of an ophthalmia which prevailed in the Royal Military Asylum; Trans. of a society, &c.* vol. iii. p. 50.

Some years ago this alarming complaint broke out in a large boy's school in Yorkshire. Blindness of one or both eyes, or serious injury to sight, from corneal opacities or other causes, took place in nearly twenty instances. We cannot suppose that the proportion of unfavourable results would have been so considerable, if proper treatment had been adopted; for, in the Military Asylum, where the cases were so numerous, only six lost the sight of both eyes, and twelve the sight of one eye.[†]

Mueller treated 1,604 cases, including two hundred relapses, in the Prussian garrison of Mentz, in three years and a half: 1,344 were restored to the service perfectly well; fifteen became blind with both eyes, ten by staphyloma, three by entire suppuration of the cornea, one by leucoma, one by dropsy of the globe. Eighteen remained with impaired vision of both eyes; six by leucoma, four by cicatrix of the cornea with synechia anterior; six by suppuration of the cornea and opacities; one by pannus. Twenty-six remained blind of one eye; fifteen by staphyloma; one by cicatrix of the cornea, with synechia anterior; nine by opacities; one by pterygium.[‡]

Symptoms and progress.—In the first stage there is redness of the palpebral conjunctiva, with watering of the eye and some stiffness of the lids; a little whitish mucus is observed on the membrane. It is not generally seen by the surgeon in this stage, and often is hardly noticed by the patient. The disease soon extends to the globe, in what may be called its second stage; and now we see it marked by high vascular action and bright redness, great tumefaction of the membrane, and profuse discharge. The redness is uniform and bright; and there are often red patches, apparently of ecchymosis. The swelling of the membrane on the globe raises it into the elevation called chemosis, which is often so considerable as to overlap and completely hide the cornea; at this period of the complaint, the whole palpebra swells, from serous effusion into its cellular texture. In this way the lids often form two large convex, colourless, or slightly red protuberances, which meet and entirely close the eye; preventing, in conjunction with the chemosis, all satisfactory examination of the cornea. The extent to which swelling of the conjunctiva proceeds in these cases is evidenced by the preternatural adhesions found after the inflammation has subsided. I have seen the conjunctiva of the upper part of the sclerotica adhering, in the form of a broad triangular band, somewhat like pterygium, to the inferior part of the cornea, after sloughing; and a similar broad adhesion between the orbital margin of the superior tarsus and the lower edge of the cornea.

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[*] P. Macgregor, *ibid.* vol. iii. pp. 44 and 45.

[†] *Ibid.* p. 49.

[‡] *Erfahrungssätze*, p. 159 and following.

The patient at first complains of stiffness in the eye-lids and globe; and then experiences a sensation as if sand or gravel were in the organ. There is, at first, profuse lacrymation, then abundant purulent discharge, not only covering the edges of the lids, and the cilia, but pouring out over the face, and dropping on the clothes. The chambers of the aqueus humor may be distended by an increased exhalation of that fluid; but there is no formation of pus. Dr. VETCH[*] expressly mentions that he never saw the latter occurrence, nor effusion of lymph into the chambers; and MUELLER[†] observes that hypopion never took place under his observation.

In the natural state of the disease, before blood-letting had been adopted, Dr. VETCH[‡] states that the quantity of matter discharged in the day must have amounted to several ounces.

As the inflammation extends to the globe, the pain is greatly increased; it becomes severe and excruciating: it is deep seated in the eye, often with fulness and throbbing of the temples, and headache. There are remissions and exacerbations in the patient's sufferings, which are often periodical. The pain often returns, and particularly the sensation of a foreign body in the eye, after it has been removed for a time by treatment.

The constitutional affection is slight; the pulse not affected, the tongue not much altered, nor the appetite impaired; yet rest is equally interrupted.

Serious affections of the cornea take place analogous to those which occur in infants, but the swelling of the palpebræ and conjunctiva does not allow them to be seen.

In the third stage there is a gradual remission of the symptoms; the swelling, pain, and discharge are lessened; the external œdema ceases, and the swelling of the conjunctiva being no longer counterbalanced, the palpebræ are everted, especially the lower.

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[*] *Book before quoted*, p. 64.

[†] *Erfahrungssatze*, p. 68.

[‡] *Account of the ophthalmia, &c.* p. 24, note.

Purulent ophthalmia in its milder form.—The foregoing account depicts the features of the disease in its most violent form, as it prevailed in the British army, and has been so well described by Dr. VETCH. The severity of the inflammation, and the destructive effects on the eye-ball, would naturally fix attention in these cases, and lead to the description of the affection as being essentially inflammation in its fullest development. In many instances, however, the disorder does not exhibit these strongly marked characters. It begins almost imperceptibly, and continues in a form so chronic, as hardly to excite attention. Its seat in these cases is the mucous lining of the eye-lids. Mr. MACGREGOR observes, that "the disease evidently began and terminated in the eye-lids, and the surface of the eye-ball seemed to be only affected by its proximity; for they were often in a diseased state for weeks, nay, even for months after every symptom of the disease, in the membranes covering the eye-ball, had completely disappeared."* He also observed, "that the sebaceous glands of the tarsi were considerably enlarged, and of a redder colour than usual."† Dr. VETCH repeatedly insists on the diseased condition of the palpebral linings, showing that it remains for an indefinite time after the inflammatory symptoms have been subdued; that it may lead, under occasional excitement, to the reproduction of the disorder in all its violence; that no case can be considered cured until this state of the conjunctiva shall have been removed; and arguing that so long as it lasts the power of infection continues.

The milder form of the complaint seems to have constituted a far greater proportion of the cases in Germany, not only in civil life, where we have had but little opportunity of observing it in England, but also in the army. It has been carefully investigated by the German surgeons, who have thus been led to the discovery, that a certain change of structure in the palpebral conjunctiva is the primary and characteristic effect of this contagious ophthalmia; that the alteration in question, which has heretofore been regarded as an effect of active inflammation, is, on the contrary, the first manifestation of disease, and the cause of inflammation when the disorder spreads to the globe of the eye; and that, in many instances, the complaint arising from contagion, and possessing the power of infection, is confined to its original seat, appearing as a slow, chronic affection, giving the patient but little trouble, and often unnoticed by him or the surgeon.

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* *Lib. cit.* p. 41.

† *Lib. cit.* p. 38.

Professor WALTHER, who observed the disorder in the prison of Brauweiler, and the neighbouring country, represents that "the proper seat, the birth-place, the nest of the disease, is always, and in all its degrees, the conjunctiva of the eye-lids. Here the disorder strikes its roots, and hence extends its destructive operation, partly into the substance of the eye-lid, partly to the eye-ball, the conjunctiva oculi being the medium, by which the disorder is conveyed to the proper tunics of the globe."[*] He says that the complaint is characterized, in the first and slight degree, by its obstinacy, and by the gradual change of structure of the palpebral conjunctiva, especially in the lower lid, which after several weeks or months appears merely loosened in texture, reddish, velvety, and granular. With the aid of a glass, or even with the naked eye, we may discover small phlyctenæ, and an exanthematous structure, which it is difficult to describe. This change is particularly observable at the reflexion of the conjunctiva from the eye-lid to the globe, where we see in the membrane a crowd of yellowish red grains, something like the ova in the roe of a fish. Fissures and grooves are seen in the velvety lining of the lids, entirely destroying its natural smoothness. Thus the palpebral conjunctiva is gradually changed into a fleshy, sarcomatous, sometimes condylomatous mass, from the uneven surface of which an abundant mucopurulent discharge proceeds.[†]

Respecting the nature of the complaint, Professor WALTHER[‡] expresses the opinion that, although it is an inflammation, the inflammatory symptoms are inconsiderable in its first degree. The peculiar change of structure in the palpebral conjunctiva, its morbid swelling, is the principal and constant phenomenon. Antiphlogistic treatment is by no means so serviceable as might be expected, if inflammation constituted the essential character of the disease. There is indeed high inflammation in the more severe cases, attended with chemosis: but this inflammation may be prevented by proper treatment; when present, it may be checked, and brought back within the limits of the first degree. The complaint still proceeds in its course, the change of structure goes on, although the inflammation may have been reduced. Moreover, where the inflammatory symptoms have been inconsiderable, we often see abundant granulations and vegetations of the conjunctiva. "Since further observations have confirmed the truth, that an eruption of small vesicles on the surface of the palpebral conjunctiva is always present in contagious ophthalmia, I should have no scruple in pronouncing the disorder to be of exanthematous character, and in considering it not so much an inflammation, as an exanthema, or rather a chronic impetigo of the conjunctiva."

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[*] *Die contagiöse Augenentzündung am Niederrhein, &c.* in GRAEFE und WALTHER's Journal, vol. ii. p. 69.

[†] *Ibid.* pp. 71, 72.

[‡] *Ibid.* pp. 89—91.

Mueller, the Prussian army surgeon, considers the term ophthalmia inappropriate, because the complaint may exist without inflammation of the eye, which is merely one of its occasional effects. "Of many hundred patients," says he, "who at various times came under my daily observation, it often happened that the half were free from all affection of the globe, or impaired sight; in part, indeed, they could not be said to suffer from true inflammation of the eye-lids; nevertheless, the disease existed in each under the eye-lids, often for months, and in a state capable of infecting whole companies." He considers the characteristic circumstance to be a morbid state of the palpebral conjunctiva, in which part of the membrane he believes that an apparatus of mucous glands exists.* He had an opportunity of examining the parts in a patient, who had long laboured under purulent ophthalmia, with ulcer of the cornea, and prolapsus iridis, and in whom, under suitable treatment, the purulent discharge had ceased, and the affection of the eye was proceeding most favourably, when death occurred from disease of the chest. "Although the disorder had here become reduced to its slightest degree, I found that portion of the membrane, which I have designated as the seat of the mucous glands in both eye-lids, altogether pale, but uniformly overspread with innumerable small papillæ; they did not exist in the rest of the membrane, which presented a perfectly normal structure. Under the membrane thus altered lay the Meibomian glands quite healthy."†

Mueller describes three gradations of the complaint. The first is inconsiderable. It is found where the person, without any redness of the eye or lids, has experienced for a few days a sense of pressure, or an uneasiness, as if a particle of dust or sand had got into the eye. The conjunctiva lining the tarsi has a villous appearance, and darkish red colour; these

* *Erfahrungsätze*, p. 4.

† *Ibid*. p. 21, 22.

changes extending for about a line beyond the orbital edges of the cartilages. The continuation of the membrane towards the globe has its natural smoothness, but its vessels are distended. There may be congestion in the conjunctiva oculi. There is increased flow of tears and mucous secretion; an irritated appearance of the eye-ball; little or no pain. The disease may prevail extensively in this mild form; it may become more serious, or it may end, under proper treatment, within two or three weeks."*

The second degree is either an aggravation of the first, or exhibits its more serious character from the commencement. The conjunctiva of the eye-lids now looks as if strewed with coarse sand; it has a more granular appearance, this character being more conspicuous when the general inflammatory tension has abated. The conjunctiva is more swoln, dark red, and covered by a puriform discharge. Particular vessels are not to be distinguished, but the membrane generally is passing into a deep red aggregation of granulations. The surrounding parts suffer more seriously; hence the general swelling of the lids. The pain is more considerable, but still resembles that caused by a foreign body in the eye. In this form the complaint is disposed to become inveterate; to go on for weeks or months; and to pass into the third more serious gradation, especially in particular conditions of the atmosphere.†

The third degree, which is the most alarming in its appearance and consequences, sometimes comes on at once in all its violence; but more commonly it supervenes suddenly on the second, after a longer or shorter time. It may be fatal to the organ in twenty-four or thirty-six hours. The peculiar disorder here affects the portion of membrane already indicated; but the disturbance is of the most violent kind, and its consequences are luxuriant morbid growths of granulations and warty elevations, the most profuse blennorrhœa, enormous swelling of the lids, ectropia, &c.‡

MUELLER then proceeds to give the following general description of the alteration, which the conjunctiva undergoes in this disorder, observing that it is the constant circumstance of the complaint, showing itself most decidedly after the cessation or removal of active inflammation. "In the lowest degree the palpebral conjunctiva appears like velvet, or as if covered with dust: in the higher gradations, like thickly strewn millet seeds or rough sand, or the granulations of a healing wound, these vegetations sometimes equalling a large lentil, which is their utmost size. They exist in great number, arising from the membrane by a broad basis, being rounded on their prominent part at first, but subsequently becoming flattened or angular by pressure against the globe. The largest are towards the middle; the smaller, which are more closely arranged, are towards the margins of the lids and the angles, especially the outer. Sometimes they lie so close together, that they seem to form one mass; but close examination will discover the fissures, sometimes tolerably deep, which separate them. This structure is more developed under the upper than the lower eye-lid, the wider surface of the former possessing a greater extent of mucous glands, and being less exposed to the air or the contact of remedies. The substance of these bodies is firm, and they run together at their bases, where the membrane generally is of the same morbid structure. The smaller prominences, examined with a magnifying glass, appear like an aggregation of hydatids, or the surface of a ripe mulberry. Their colour varies, according to the degree of inflammation or vascular turgescence. Hence we see all gradations, from the darkest blood red to the palest brick colour.

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* *Erfahrungsätze*, p. 25—28. † *Ibid.* p. 29—31. ‡ *Ibid.* p. 31—33.

The prominence of these characteristic granulations is generally, but not constantly, in proportion to the degree or intensity of the inflammation, but by no means to its extent. I have often seen them comparatively small after the most acute inflammation, which had spread with great danger over the eye-ball; and much more luxuriant under a slower and more confined inflammation. Whence we may conclude, that the peculiar inflammatory disturbance in the focus of the complaint, although less obvious to the observer, had acted more powerfully on the affected parts.

Where this change of structure has become established, we need not expect to accomplish its sudden removal, although there are certain limits to its progress. We must not regard it as a mere effect of inflammation, like ordinary thickening, induration, or loosening of structure; but rather as the proper organ of the disease, which required an inflammatory impulse for its development and establishment, but may then become habitual, lasting for months or years, and constantly producing a contagion, capable, under certain conditions, of propagating itself by the infection of others.

Although sight is generally impaired by the long continuance of this morbid change, there are other cases, or at least periods in these cases, when, after the removal of the symptomatic affections, the eyeball is perfectly free, and yet the disease continues under the eye-lids in its full luxuriance. We can often, indeed, discover externally, from the swelling of the eye-lids, the irritated appearance of the eye, the narrowing of the palpebral fissure, together with, in some instances, a slight gaping of the ciliary margins, that there must be something wrong under the lids; and we find, on everting them, the above-described changes in their linings. The state of the weather has a marked influence on the complaint, even in its chronic form. The disease, which seems nearly removed and quiet to-day, may be much more considerable to-morrow, and *vice-versâ*. Yet the morbid structure shows but little sensibility to the touch, or other external irritants. No ulceration follows excision or cauterisation of the granulations. Abscesses or phlyctenæ do not take place, as in the conjunctiva oculi." *

"The disease begins at the inner edge of the ciliary margin, not including the puncta lacrymalia, occupies the lining of the tarsi, and ends one line beyond these cartilages. Every thing beyond these limits is symptomatic affection, to which head we must refer the very frequent participation of the rest of the mucous membrane. The latter frequently displays increased redness, chronic swelling, thickened folds, &c. but never granulations." †

EBLE, an army surgeon in the Austrian service, and prosector at the Josephine Academy, had ample opportunities of observing the contagious ophthalmia in the military hospital of Vienna, where he had the charge of the ophthalmic patients. His account corresponds nearly to that of MUELLER. He establishes two principal divisions of the disease, the acute and chronic; describing the latter first, because it exhibits the peculiar character of the disorder, and because the acute is generally ingrafted on the previously existing, though not always recognized, chronic form of the disease. At the earliest period of the latter, when the individual has not complained, and is not aware that any disease exists, and when therefore it very rarely comes under the observation of the surgeon, he has found small serous cysts or phlyctenulæ on the surface of the conjunctiva; these are soon lost in the subsequent thickening and granulation of the membrane.*

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* *Ibid.* p. 36—41.

† *Ibid.* p. 41, 42.

Effects of the Inflammation.—1. *Sloughing of the cornea, general or partial?* This, which is not an unfrequent result of acute gonorrhœal ophthalmia, has not occurred within my observation, in the contagious, purulent disease; nor have I found it mentioned in the writings of those who have seen the disorder extensively prevalent among large bodies of men.

2. *Bursting of the cornea?*—In this disease, and in acute gonorrhœal ophthalmia, the eye is sometimes said to *burst*. A paroxysm of excruciating pain is suddenly terminated by a sensation of something giving way; a little hot fluid runs down the cheek, and great relief is experienced. When the subsidence of the palpebral swelling allows the eye to be examined, we always find, in such cases, that the anterior chamber has been penetrated, that there is extensive disorganization of the cornea by suppuration or ulceration, and that vision is lost. I have considered this occurrence to be the result of an ulcerative process, consequent on sloughing, or suppuration of the cornea. Dr. Vetch,† however, represents the matter in a different light. In one case he saw the cornea shortly before it burst, and it exhibited no perceptible alteration. He examined it again soon after, and found it presenting so natural an appearance, that he doubted the accuracy of the sensation. He at last discovered a small line, extending across the lower segment of the cornea, and remaining unaltered after the eye had been washed with tepid water. The next day a slight opacity appeared along the line, and increased daily till the greater part of the cornea was not only opaque, but projected in an irregular cone. He adds, "Other cases have occurred, which, by corresponding with the above, confirm the account I have now given; from which it appears that the aqueus humor escapes by a division of the cornea, nearly as clean as if cut by a knife; and that it is to the at-

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* *Ueber den Bau und die Krankheiten der Bindehaut des Auges, mit besonderem Bezuge auf die contagiöse Augen-Entzündung.*—Vienna, 1828.

The serous vesicles of the conjunctiva are represented in Plate III., fig. 15. This, and the other figures of the same plate, which are coloured and highly-finished, represent faithfully and beautifully the various stages and forms of the structural change in the palpebral conjunctiva.

Mueller has devoted two coloured plates to the same subject in his *Neuesten Resultate*; the figures are expressive, though much inferior in execution to those of Eble.

Other representations may be seen in Graefe, *Augen-Blennorrhöe*, &c. Tab. I. III. and IV. and in the two works of Vetch.

† *Account of the Ophthalmia*, &c. p. 60, and following.

tempts of the part to effect a reunion under the presence of disease, that the future deformity is owing." *

3. *Suppuration of the cornea*, and its subsequent destruction by ulceration.—In the progress of the latter, the lens may become exposed, so that the patient recovers for a short time tolerable sight, which however is soon lost again, as the progress of disease leads to the escape of the humours, and collapse of the globe.

4. *Ulceration of the cornea.* This may occupy a considerable portion of the surface, or it may be smaller. Sometimes it forms a deep groove along the margin of the cornea, occupying one half of its circumference, or more. The ulceration may extend in surface, or it may become deep, and penetrate the anterior chamber.

5. *Interstitial deposition*, either into the conjunctival covering, or throughout the corneal laminæ, occupying a portion only, or the whole cornea, and causing opacity, in every degree, from the thinnest film to the most dense leucoma.

6. *Opacity* from cicatrization of ulcers.

7. *Prolapsus iridis*, total (*staphyloma racemosum*), or partial.

8. *Adhesion of the iris to the cornea* (*synechia anterior*) in various extent, consequent on prolapsus, or occurring when the cornea is violently inflamed, and therefore seen in conjunction with the various effects of such inflammation.

9. *Loosening and thickening of the mucous membrane* covering the cornea, with enlargement of its vessels, and more or less diminution of its transparency. This change occurs in various degrees from slight vascularity to pannus.

10. *Staphyloma*, general or partial, dropsical enlargement of the globe, or collapse of its tunics, are more remote effects produced by some of the changes just enumerated.

11. A weak and irritable state of the eye, with want of power to bear even slight exertion. This, which disappears sooner or later, is a less serious affair than a degree of impaired vision (*amblyopia*,) which has sometimes remained, even in cases of the milder description, without any change in the transparent media of the eye. The latter circumstance is explained by appearances observed after death in the examination of persons who had been affected with this disease. The dissections in question, which were made by Professor MAYER of Bonn, are detailed in the paper of WALTHER.† He found

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* *Account of the Ophthalmia*, &c. p. 64.

† GRAEFE und WALTHER'S *Journal*; vol. ii. p. 100—108.

turgidity of the vessels in the orbit, and distended vessels surrounding the optic nerve; the choroid deprived of its pigment almost entirely, or partially, and red, or violet red, instead of its natural brown colour; the retina, in one case, firmer, and adhering to the choroid; the lens, in one case and the vitreus humor in another, yellow, like gold; the vessels of the brain and its membranes turgid, with increased secretion into the ventricles, and serous effusion under the arachnoid. The changes in the choroid were seen in three out of five examinations; and in two of these the affection of the eye was mild.

12. Although change of structure in the palpebral conjunctiva is the commencement of the complaint, and the cause of the more general inflammation, the latter aggravates the primary affection; so that the considerable thickening and induration of the membrane, with the roughening of its surface by large folds and masses of granulation, must be regarded as consequences of inflammation.

13. *Temporary and permanent ectropium and entropium.* Some redness of the membrane, with slight swelling and a little discharge, often continue for a long time.

There is great tendency to relapse, especially when the conjunctiva has not been restored to a healthy state; and inflammation may be renewed by slight exciting causes. I have known the complaint to return, in a strongly marked form, many years after its first appearance. Hence, when we consider the difficulty of restoring to its healthy state a part which has undergone a change of structure so serious as that which the palpebral conjunctiva undergoes in this disorder, we shall not be surprised at hearing that patients may suffer from it for ten years or more, and that WALTHER doubts whether the conjunctiva ever completely regains its normal state of nutrition and secretion.*

Diagnosis.—The characters of the complaint are so strongly marked, that it is not necessary to enlarge on this part of the subject. Catarrhal ophthalmia is the only affection liable to be confounded with it. The peculiar change of structure in the palpebral conjunctiva, the long continuance of the complaint, and the relapses, the great swelling chemotic and palpebral, the violent vascular congestion and general bright red of the membrane, with the profuse purulent discharge, are sufficient distinctions. The affections of the cornea, which are very uncommon in catarrhal ophthalmia, afford an additional ground of discrimination.

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* *Lib cit.* pp. 37 and 96.

The two diseases, however, if we look merely to an attack of the contagious disorder, without embracing the whole history, differ more in degree than in kind: the distinction between a mild catarrhal, and an acute purulent case is obvious enough; but we might not be able to distinguish between a mild purulent, and a severe catarrhal ophthalmia. There would be no difference in treatment.

Prognosis.—The affection is much more formidable; the danger to the eye is greater than in infants or children. The complaint is less manageable, and therefore the issue is more uncertain. If the cornea retain its natural transparency, we may expect to arrest the inflammation by vigorous treatment; if it be dull, and deep seated pain of the eye and head announce extension of inflammation to the globe, the event is doubtful. After partial suppuration, considerable ulceration, or interstitial deposition, recovery of sight may take place, particularly in habits not very plethoric. Much will depend on the position of these changes in the cornea; if they should be towards the circumference, they may not interfere with vision.

Causes of Purulent Ophthalmia.—Opposite opinions have been entertained, and continue to be held, respecting the origin and nature of this affection.

Some consider it a specific disease, only communicable by contact of the puriform discharge; endemic in Egypt, and brought to Europe by the French and English troops: hence the name of *Egyptian ophthalmia*. Others regard it merely as a catarrhal inflammation of the eye, and consider that the severity of the disease in Egypt is attributable to the peculiar circumstances of that country, which are calculated to favour the production of catarrhal complaints, and to render them severe. Although it seems to involve merely a question of fact, we have not as yet the means of determining which is the correct view. If the disease be contagious, is it excited by direct application of the morbid secretion, as in gonorrhœa and syphilis? Can the morbific influence be conveyed by the atmosphere, as in measles and scarlet fever, or in both ways, as in small pox? In order to settle the point, we ought to institute experiments, which, for obvious reasons, we cannot do. We want to apply discharge from the diseased to healthy eyes, and to observe the effect of such application; but this proceeding is clearly impracticable. With respect, therefore, to the question, whether the disease can be produced by the direct application of matter to the eye, we must content ourselves with a few facts presented by casual observation, and with indirect arguments. Mr. MACGREGOR, in the account which he has given of this affection, as it occurred in the Royal Military Asylum, mentions three instances, in which the origin of the complaint from direct infection was unequivocal.

The cases are interesting, not only in this respect, but as they show how quickly the application of the cause is followed by the development of the morbid phenomena. About four o'clock, P. M., a nurse in syringing the eyes of a boy, in whom there was much purulent discharge, found some of the matter spirt into her right eye. She felt little or no smarting at the time; but towards nine o'clock in the evening the eye became red, and somewhat painful. When she awoke the next morning, the eye-lids were swelled, there was purulent discharge, and she complained of pain in the eye-ball. The usual remedies were employed the next morning, and she got well in three weeks or a month. The left eye did not suffer.

Matter was applied in the same manner to the left eye of another nurse at nine, A. M. By direction of Mr. MACGREGOR, who was immediately informed of the occurrence, the eye was bathed for several minutes with lukewarm water. About seven in the evening, the eye began to itch violently. When she awoke next morning, the eye was considerably inflamed; the lids were swelled, and she had a sensation as if sand were lodged under the eye-lid. In the course of this day, purulent fluid issued from the eye. The disorder subsided in fourteen days, the right eye having remained sound.

Another nurse who had been sponging with warm water the eyes of a boy suffering severely from purulent ophthalmia, inadvertently applied the sponge to her right eye about eight in the morning, and took no means to prevent infection. Between three and four P. M., great itching of the eye took place, and before she went to bed it was considerably inflamed. Next morning all the symptoms of purulent ophthalmia were completely developed; they increased in severity in spite of all the means employed to check them, and the eye-ball burst on the fourth day; the inflammation continued for three months: the left eye did not suffer.*

Dr. GUILLIÉ, of Paris, has shown that the disease may be communicated by the direct application of the puriform secretion to a sound eye. He introduced under the eye-lids of four blind children, the discharge from the eyes of children labouring under purulent ophthalmia; and the disease was produced in each instance.[*]

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* Page 51—54.

Mr. MACKENZIE believes that the ordinary catarrhal ophthalmia is contagious. "I regard it," he says, "as scarcely admitting of doubt, that the discharge in catarrhal ophthalmia, especially when distinctly puriform, if conveyed from the eyes of the patient to those of others, by the fingers, or by the use of towels and the like in common, will excite a conjunctivitis still more severe, more distinctly puriform, and more dangerous in its effects on the transparent parts of the eye, than was the original ophthalmia. This is the conclusion at which I have arrived, from the observation of many instances, in which, as far as it was possible to come to the facts, this disease having arisen in one member of a family from atmospheric exposure, several others of the family have become affected without any such exposure that could be ascertained; and while, in the first affected, the disease was comparatively moderate, and scarcely puriform, in the latter the symptoms were more violent, and the discharge thick, abundant, and opaque."[†] He also considers it extremely probable that the discharge from the conjunctiva in catarrho-rheumatic ophthalmia would excite disease in the same way if applied to a sound eye.[‡] Dr. VETCH entertains the same opinion as Mr. MACKENZIE respecting the contagiousness of all the ophthalmiæ, which are attended with puriform discharge. "From whatever cause," says he, "inflammation of the conjunctiva may originate, when the action is of that nature or degree of violence, as to produce a puriform or purulent discharge (ophthalmo-blennorrhœa,) the discharge so produced operates as an animal virus when applied to the conjunctiva of a healthy eye."[§]

Various attempts have been made to illustrate the question of contagion by experiments on animals. Dr. VETCH[‖] applied the puriform secretion of the conjunctiva to the eye of a dog, in which it soon produced considerable irritation; but the animal was lost, so that the result of the experiment could not be ascertained. VASANI[¶] communicated the disease to dogs by applying to the mucous lining of the eye-lids recent matter from the eyes of patients labouring under the disease, or matter which had been dried on linen. One dog contracted the disorder by being dipped in a vessel of water, in which the eyes of two other dogs labouring under the complaint had been frequently washed. In these experiments the inflammation appeared four days after the application of matter. GRAEFE[*] produced the disease in dogs and cats repeatedly by the application of matter to their eyes. On the other hand, no infection took place in numerous experiments very carefully performed by MUELLER.[†] He inoculated five cats, ten dogs, two rabbits, two squirrels, two blackbirds, a starling, a yellowhammer, and a cock. He took matter from the eye early in the morning before the patients had washed their eyes, collected it with a camel-hair pencil, and introduced it under the upper and lower lid in each eye, leaving the pencil quietly for a few seconds, and then pressing it so as to squeeze out the matter effectually. He also smeared the matter copiously and repeatedly along the edges of the lids. Not the slightest effect was produced in any one instance.

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[*] *Bibliothèque ophthalmologique*, vol. 1, p. 81.

[†] *Practical Treatise*, p. 333.

[‡] *Ibid.* p. 415.

[§] *Practical Treatise*, p. 175.

[‖] *Account of the ophthalmia*, &c. p. 13.

[¶] *Storia dell'ottalmia contagiosa dello spedale militare d'Ancona.* Verona, 1816. p. 40, and following. According to OMODEI, *Cenni sull' ottalmia contagiosa*, p. 101. RIMA had already performed similar experiments.

The idea of contagion is strongly supported, though not absolutely proved, by a general view of the origin and progress of the complaint, as it appeared in Europe. We know that it had not been noticed prior to the occurrence of the contest in Egypt; that the French and English armies suffered from it severely in that country; that in Sicily, Malta, and Gibraltar, places at which detachments of the army sojourned on their return from Egypt, numerous cases occurred: and that in various portions of the army, in this country, the disease has prevailed extensively; the complaint having broken out first among those troops who had formerly been in Egypt, or in such corps as had had direct communication with regiments returned from Egypt. The progress of this complaint has been traced, in all such cases, by the intercourse of fresh troops with the infected. The conclusion of its contagious nature suggests itself forcibly to the mind, on reading the narrative of the gradual development and progress of the complaint in particular instances. The account given by Mr. EDMONSTONE[*] of the disorder, as it appeared in the Argyleshire Fencibles, published in 1802; the excellent description of Dr. VETCH,[†] in a pamphlet published in 1807, and the interesting narrative of Mr. MACGREGOR, already quoted, may be consulted on this point.

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[*] *Die. epid. contag. Augenblennorrhöe*, p. 35. He mentions that a similar experiment was performed on a dog and a cat by another surgeon; that inflammation with serous discharge followed in both animals on the third day; on the fourth and fifth there was swelling of the palpebral conjunctiva with copious mucous discharge, which lasted till the fourteenth. *Ibid.* p. 36.

[†] *Erfahrungsätze über die contagiöse oder Aegyptische augenentzündung; Mainz*, 1821, p. 102.

The manner in which the disease spreads, leads us, prima facie, to the conclusion that it is contagious. It extends very rapidly, when persons are crowded together in great numbers, as among common soldiers in barracks, where many are obliged to use the same utensils and the same linen; whilst the officers, who have better ventilated, and more capacious apartments, and live separately, generally escape. In the town of Mentz, which was garrisoned by Prussians and Austrians, the complaint broke out and spread extensively among the Prussian soldiery, whilst the Austrians, who inhabited another part of the town, and were in separate barracks from the Prussians, entirely escaped.[‡] We see instances in which the affection has attacked several individuals of the same family—the father, mother, and several children—appearing to have spread from one to the other. Again, when the disease has prevailed among bodies of men, it has been successfully extirpated by separating the affected from the healthy, and confining each individual to his own cloths, sponges, and utensils. These general views of the subject seem to have been strongly impressed on the minds of those who have seen the complaint extensively prevalent, and have led them to believe that it is contagious: the opinions of Mr. MACGREGOR, Mr. EDMONSTONE, Dr. VETCH, and other army surgeons in this country may be quoted. The same opinion has been held and defended on the continent by RUST,[§] WALTHER,[‖] MUEL-

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[*] *Account of an ophthalmia, which appeared in the 2nd regiment of Argyleshire Fencibles,* &c.; also in a *Treatise on the varieties and consequences of ophthalmia,* p. 13, and following.

[†] *Account of the ophthalmia which has appeared in England since the return of the British army from Egypt.* Also *Practical treatise on the diseases of the eye,* part ii. chap. iii.

[‡] RUST, in the work next quoted, p. 14. MUELLER, *neuesten resultate,* &c. p. 21.

[§] *Die Aegyptische Augenentzündung unter der Königl. Preuss. Besatzung in Mainz.* Berlin: 1820.

Within a few months every third man in the garrison had been affected; and RUST found the disease then spreading rapidly, p. 21. From June, 1818, to April, 1819, the whole number of cases, including 250 relapses, was 1798, without including a regimental surgeon, two hospital surgeons, and twelve nurses, who took the disease.—p. 44.

[‖] *Die contagiöse Augenentzündung der Niederrhein, besonders in der Arbeitsanstalt*

LER,* GRAEFE,† and OMODEI,‡ who have seen purulent ophthalmia on a large scale. WALTHER is so strongly convinced, that he calls it ophthalmia contagiosa, and compares it, in this respect, to the exanthemata. He considers the little granular bodies which appear on the conjunctiva to be analogous to the eruptions on the skin in the exanthemata. I do not adopt this view, but mention it merely to show how strongly the minds of accurate observers have been impressed with the contagious nature of the complaint.

Although the evidence afforded by Mr. MACGREGOR proves satisfactorily the contagious nature of the disease, it does not show so clearly the mode in which the communication is effected. He says, indeed, that "the disorder appears to be communicated by the purulent matter of a diseased eye being applied to that of a sound person;" and he mentions no other mode of infection. Yet we cannot help concluding from the facts he has furnished, that this is not the only way in which the disease may be produced. If he had traced the actual application of matter in many out of the hundreds of cases which came under his observation, he would hardly have

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Brauweiler, in ihrem zusammenhange mit der Aegyptischen ophthalmie betrachtet; GRAEFE und WALTHERS' *Journal*, vol. ii.

This is a very interesting account of the disease as it prevailed for some years in a prison, where the inmates were kept to hard labour, at Brauweiler, and in the neighbouring country of the lower Rhine. Professor WALTHER describes minutely the phenomena of the complaint, and the points of distinction between it and the other affections of the eye, particularly the catarrhal and gonorrhœal ophthalmiæ, and the inflammatory chemosis. After the disorder had existed in the prison for some years, appearing like an epidemic, declining and re-appearing, affecting the keepers and attendants as well as the prisoners, it had become nearly general in 1819, so that when a careful examination was made in 1820, scarcely a single prisoner was found in whom the eyes were not either diseased or in a suspicious state.—p. 43.

The disorder, as it appeared in this prison and the neighbourhood, had a less acute character than it has shown in the English army.

[*] *Erfahrungssätze über die contagiöse oder ägyptische augenentzündung*; Mainz, 1821.

Die neuesten Resultate über das Vorkommen, die Form und Behandlung einer ansteckenden Augenliederkrankheit unter den Bewohnern des Niederrheins; Leipzig, 1823.

Of these pamphlets, the first gives an excellent account of the subject, drawn chiefly from observation of the disease in the Prussian garrison of Mentz: the latter is principally occupied in showing its extension, and delineating its forms and treatment in some districts of the Prussian provinces on the Rhine. The former, and the paper of WALTHER already quoted, contain perhaps the best accounts that we possess of the nature and treatment of this formidable disease.

[†] *Die epidemisch—contagiöse augenblennorrhöe Aegyptens in den Europäischen Befreiungsheeren; ihre Entstehung, erkenntniss, vorbeugung und Heilart, während der Feldzüge* 1813, 1814, *und* 1815, *beobachtet*. Folio. Berlin, 1823.

[‡] *Cenni sull 'ottalmia contagiosa d'Egitto*; Milano, 1816.

related in detail the three instances already quoted. It will be observed too that in each of these one eye only suffered, that to which the morbific matter was applied. Not only were the children of the institution affected, but various other persons who had communication with them; these must have been aware of the circumstance, if matter had been applied to their eyes, and would no doubt have mentioned it, when the contagious nature of the complaint was so well known. In May, 1804, several bad cases of ophthalmia were admitted into the infirmary. On the morning of the fourth day after their admission, two boys in the same ward labouring under other complaints were attacked with inflammation of the eyes, and in the course of that week the nurse took the disease. Her son, who had been in attendance on the sick, and in a few days after her two younger children, were attacked, as were several of the sick in the same ward. In the course of June, in which ninety fresh cases occurred, the nurse of the girls' hospital caught it, and her husband, an in-pensioner of Chelsea Hospital, who came daily to see her, was also seized with it, as likewise were two occasional nurses. No other person was at the same time affected with ophthalmia in Chelsea Hospital. The wife of a field officer was at this time on a visit at the Military Asylum. She had a son between five and six years of age, who used to play with the other boys. He caught the ophthalmia, and on the fourth or fifth day after it appeared, his sister, two years old, was seized, and some days after this the lady herself took it. Great attention was now paid to the immediate separation of the diseased from the healthy, and all other means of checking contagion were adopted: yet the disease continued to spread, for ninety-five cases occurred in July, and ninety in August. A boy and a girl, brought from Scotland, arrived at the Asylum one evening in the end of this month. They were inadvertently put into a ward occupied by ophthalmia patients, but immediately removed when the circumstance was observed by Mr. MACGREGOR next forenoon; on the third morning after their arrival both the children had the complaint. "All the boys from five to six and a half years of age are formed into one company. It was observed that in the course of the last and present month, almost the whole of this company took the ophthalmia. Its progress could in their dormitories be traced from one bed to another, in the order in which they were placed, until nearly the whole were affected. The two nurses attached to this company always slept in their wards, and were the only nurses belonging to the institution, (those connected with the Infirmary excepted) that suffered from the disease. About the middle of this month I caught it myself; and though the inflammatory symptoms subsided in ten days, I did not recover from its effects for five or six weeks."

The disease was less prevalent in the Asylum in 1805 and the three following years; but the number of cases was considerable in the summers of 1808 and 9 and the spring of 1810. As it was spreading rapidly in April and May of the latter year, all the affected children were removed into a detached building, so as to cut off the communication entirely between the healthy and the diseased. From that time the disorder gradually declined.

In proof that the disease did not depend on a peculiar state of the atmosphere, or any other general cause, Mr. MACGREGOR observes that the disease had prevailed for nearly a month among the boys before the girls were attacked; and all the adults, who did not mix with the sick, escaped it, while those who were connected with them all suffered, the assistant surgeon excepted.

Dr. VETCH[*] is decidedly of opinion that the disease is not communicable by contagion operating through the medium of the atmosphere; he thinks direct application of matter necessary to its propagation.

MUELLER, on the contrary, who seems to have employed most diligently his extensive opportunities of observation, thinks that the contagion is generally conveyed by the atmosphere. He concludes from this circumstance that it could also be propagated by contact; but his experience had furnished him with no direct proofs.[†] He never saw an instance in which the occurrence of the disease could be traced to the contact of matter, by smearing, injection, or evaporation, unless the infected person had been exposed for a considerable time, and repeatedly, particularly in the night, to an atmosphere rendered impure by an assemblage of patients. Relations were allowed to visit the sick, such visits taking place in a separate apartment, and being limited to half an hour; disease was never communicated on such occasions in spite of the close contact in embracing and caressing, which would necessarily occur in the meetings of parents and children, brothers and sisters, husbands and wives. He knew no instance of infection by means of clothes, bedding, or the washing or cleansing of linen or other articles.[*]

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[*] *Account of the ophthalmia, &c.* p. 10 and following. *Practical Treatise,* p. 179.

[†] *Erfahrungsätze*, p. 77.

In proof of his opinion that the contagion does not act through the medium of the atmosphere, Dr. VETCH alleges that the medical attendants on the sick were never infected. WALTHER,[†] on the contrary, states that the nurses and attendants of every description, and the physician, contracted the disease at Brauweiler. MUELLER[‡] also informs us, that at Mentz many nurses and medical attendants suffered, as well as the president of the hospital commission, and an inspector, who, in the assiduous exercise of their duties, passed much time in the wards.

Several arguments have been adduced against the contagious nature of the affection, such as, in the opinion of some, to leave the point still in a state of doubt. In the first place, the country in which this contagion is supposed to have originated, and where it still remains endemic, is one which has attracted the attention of philosophic observers in all ages. If it be not the birth-place, it must be deemed the cradle of the arts and sciences; we trace them back to Egypt, as the earliest place of their distinctly recognized existence. We find that at a very remote period the Egyptians had made great advancement in sculpture, architecture, and painting; we find that the same prodigious remains which still astonish us, existed, nearly in their present state, more than two thousand years ago. Egypt was resorted to by the philosophers of Greece; and HERODOTUS, who travelled in the country for scientific purposes, and who has presented us with an accurate description of it, notices, even in his time, the great prevalence of diseases of the eye. VOLNEY[§] mentions, that in the streets of Cairo, where the disorder prevails throughout the year, but is more prevalent at the vernal equinox, you may find, out of one hundred persons whom you meet accidentally, twenty blind, ten with only one eye, and twenty more whose eyes are red, purulent, or covered with films. SAVARY[‖] says, that in the grand mosque of Cairo there were eight thousand blind persons. HALLER, in his *Bibliotheca Chirurgica*, calls Egypt "Cæcorum in omni tempore fæcunda nutrix." None of the ancient travellers had any idea that the disease was contagious; and the Egyptians themselves, at the present day, have never entertained such a notion. None of the English or French army surgeons or physicians, who saw and treated the disease in this reputed source of infection, supposed the complaint to be contagious.

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[*] *Erfahrungsätze*, pp. 80, 81.

[†] GRAEFE *und* WALTHER's *Journal*, vol. ii. p. 113.

[‡] *Erfahrungsätze*, p. 82.

[§] *Voyage en Syrie et en Egypte*, vol. i.

[‖] *Lettres sur l'Egypte*, vol. iii.

This notion of a specific contagion, imported from Egypt, originated in Europe, never having occurred in the supposed birth-place of the virus. ASSALINI, who accompanied the French army into Egypt, as surgeon to the viceroy of Italy, expressly denies the existence of contagion. He, and the other medical observers who actually witnessed the affection in Egypt, refer it to the ordinary causes of ophthalmic disease. They observe, that the atmospheric influences capable of producing catarrhal affections, are very powerful here. The intolerable heat of the day is followed by night chills and heavy dews; the land is periodically inundated and covered with water, which remains to be evaporated by the heat of the sun. Such causes act on the eyes, already predisposed to disease by a combination of injurious influences: such as the great heat of the country; the powerful light; the great glare from the sandy surface; the atmosphere of dust caused by the light sand composing the soil, being raised into the air by the least breath of wind. Hence ASSALINI, and other direct observers in Egypt, regard the disease as acute catarrhal inflammation, principally affecting those much exposed to the exciting causes, as soldiers and the lower orders, while officers and the wealthier escaped.

In corroboration of the non-contagious nature of the affection, I may observe, that in all cases where collections of individuals, labouring under it, have been separated and dispersed, as when troops are disbanded and go into civil life, the complaint does not extend. If it were contagious and capable of producing a like disease in others, we should suppose that this would be the very way to spread it all over the country; but we find it the most effectual mode of putting a stop to the disorder. There is no dissemination of the complaint in the families, or districts, to which the soldiers or other persons so afflicted return.

WALTHER* observed, that the complaint seemed to lose its contagious property when single patients lived in their families, under the ordinary domestic relations, even in confined dwellings, whatever the stage of the complaint might be, and however long it lasted. He only saw one exception to this observation. Patients labouring under the contagious ophthalmia were received into the clinical hospital of Bonn, and at first carefully separated from the others: but the separation was not continued, and no infection ensued, either of the other patients or attendants. It must be observed, that all the arrangements of this institution are particularly calculated to secure the health of the inmates.

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* *Lib. cit.* p. 119, 120.

In investigating the contagious or non-contagious nature of this complaint by direct experience, there is a great difficulty, and one not likely to be soon removed. However, we know that individuals have not been wanting who, from their desire of determining certain points of pathology, have inoculated themselves with matter supposed to be most infectious and dangerous. This has been done with the matter of buboes in the plague; and therefore we need not be surprised if somebody has been found to try the application of the puriform discharge to his own eyes. One such experiment is recorded in the 12th volume of the *Edinburgh Medical and Surgical Journal.* MR. MACKESY, who had been with his regiment in Egypt, where it had suffered much from purulent ophthalmia, determined, whilst staying on its return at Messina, in Sicily, to make a decided experiment. He soaked a rag in the purulent secretion of the eyes of three patients, and then applied it for more than an hour to his own eyes, and pressed it repeatedly against the lids, to introduce the matter between them, which produced a slight smarting pain. He then went out and walked a mile, a sirocco wind prevailing and blowing dust in all directions. He put the rag again on the eyes at night, and wore it through the night; he moistened it in the morning, and applied it again, when moist, to the conjunctiva: no inflammation ensued.

I think that the apparently contradictory opinions which have been entertained on the subject may be in some measure reconciled. I certainly cannot agree with DR. VETCH, in supposing that the smallest particle of the purulent secretion may give the disease, and that the contagious property remains as long as any purulent fluid is secreted, that is often for many months or years. At least there is, as yet, no sufficient evidence to establish those points. If contagion exists, it must be very different from that of small-pox, scarlet-fever, or measles; much less active and certain. At the same time, when I look to the instances in which the affection has prevailed extensively; when I see how the disease has gradually spread through large bodies of men, and how effectually its progress has been arrested in so many cases by insulating the diseased, and preventing all intercourse between them and the healthy, I feel fully satisfied that the disease is contagious, under certain circumstances and conditions, although I cannot assimilate it to the well-known contagions. We see small-pox, measles, and scarlet-fever, extend themselves in a fixed, regular, and determinate manner, to which there is no analogy in purulent ophthalmia.

If the accounts of patients themselves can be at all relied on, respecting a fact which they can have no interest in concealing or misrepresenting, there is abundant evidence that the disease arises from other causes than from the application of matter from the eyes of one individual to those of another. I frequently saw, at the London Ophthalmic Infirmary, patients labouring under purulent ophthalmia, in whom no communication could be traced with others similarly affected. I should therefore say that this disease may be produced by common causes, without the application of morbid matter to the eye. But, when once excited, it appears capable of propagating itself, under particular circumstances, in a way which we cannot distinguish from a contagious propagation. When individuals are crowded together in great numbers in confined habitations, sleeping in the same rooms, using the same linen and the same utensils, and not carefully attending to personal cleanliness, deleterious influences on human health are produced from the bad air, noxious effluvia, and close personal intercourse inseparable from such states. The injurious operation of such causes is notorious, though their nature and mode of action are obscure. It is augmented by the addition of unwholesome diet, insufficient clothing, and bad ventilation. Hence the only instances of extensive spreading and great virulency of purulent ophthalmia have occurred in barracks, transports, and other ships, in schools, prisons, and workhouses.

In the doubt which still exists respecting its contagious nature, there is an analogy between this affection and typhus; the contagion in both, if we admit its existence, only shows itself under peculiar local circumstances, such as an atmosphere vitiated by human effluvia, crowded and confined dwellings, and want of domestic comforts. When we see that the question of contagion is not yet settled in typhus, we need not be ashamed nor surprised at the uncertainty on the same point in purulent ophthalmia. That all who are exposed do not become affected with purulent ophthalmia is a circumstance common to it, with other contagions, none of which act uniformly and invariably on all who come within their range. The presence of the contagion is one only out of several conditions necessary to the production of the morbid phenomena: the state of health and of the particular organ in the exposed individual, and the surrounding influences, atmospherical and others, are equally important, but as yet imperfectly understood. MR. MACGREGOR observed that purulent ophthalmia was influenced by the state of the atmosphere, being much more severe in its attacks, and of longer duration, in hot and sultry, than in cold, weather.* Thus, in the first year of its appearance at the Military Asylum, it ceased in the winter, although measures of separation had not been adopted.† In the four following years some cases occurred in the spring, summer, and autumn, but none in the winter. In the winter and spring of 1808, the asylum was free from the disease, which broke out again in June, when the weather was extremely hot. In January, February, and March, 1809, those previously affected recovered; but the disorder re-appeared in the spring, and became very violent in the summer.‡

DR. VETCH§ found that the state of the weather and local peculiarities were capable of seriously aggravating the symptoms: a humid atmosphere and marshy soil were particularly unfavourable. "The disease first assumed its violent and characteristic symptoms in barracks, either in or on the borders of Romney Marsh. Its next appearance under this form was at Feversham and Hilsea, both of them low situations and surrounded by ditches, and till very lately proverbial for the production of ague. Some of the worst cases were also received into the depôt from low situations in Essex. The disease presented itself in the 1st regiment of foot, stationed in the Castle of Edinburgh, but no instance of particular severity occurred, although a considerable number were admitted into the hospital. The high and salubrious situation of that place is sufficiently known. The disease, however, still existing in the regiment, it afterwards broke out at Maldon in Essex, and since its first appearance, in 1805, it has nowhere produced such cruel ravages, or sent so many objects of its violence to the hospitals." "At the barracks at Aldwick, which formed one of the stations of the ophthalmic hospitals, and the situation of which is particularly damp, ten cases of relapse occurred for one at Selsea. In many instances, when the disease has evinced little disposition to assume its characteristic violence, and when its nature has been consequently doubted, on the setting in of wet weather the suppurative form of inflammation has come on with the utmost severity."

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* *Lib. cit.* p. 37. † P. 35. ‡ P. 46, 47.

§ *Practical Treatise*, p. 108, and following.

That certain conditions of the atmosphere, and other external causes, are necessary to the propagation or increase of purulent ophthalmia, may be inferred from what I have already mentioned; and that a disorder of the eyes may arise and spread, as if by contagion, without any reference to Egyptian origin, or any application of purulent matter, has been evidenced in various instances. DR. EDMONSTONE* quotes a narrative of the casual development of ophthalmia, in an English ship of war in the West Indies. This ship, the Albemarle, being off the coast of St. Domingo, met a slave-ship, from which three sailors were taken on board. These had inflamed eyes, and when interrogated respecting the disorder, they said they were getting well from a most painful complaint, which had affected nearly all the persons on board the slave-ship. On the fourth day after their reception two sailors of the Albemarle were affected with inflammation of the eyes; the next day, several more were seized; and by the seventh morning twenty-two had become unfit for duty from this cause. The captain now adopted the expedient of separating the diseased from the healthy, and thus stopped the progress of the disorder.

A more remarkable example has happened of late years, on board a French ship, which left Africa with its crew and cargo quite healthy, and free from all affections of the eyes. During the voyage to the West Indies, and fifteen days after leaving the coast of Africa, a severe inflammation of the eyes broke out amongst them, accompanied by puriform discharge. It made its appearance first among the slaves, and then extended to the crew; and by the time the ship arrived in the West Indies, there was barely a sufficient number of individuals retaining their sight to work the ship into the harbour. Of the crew, who were in number twenty-two, twelve lost their sight; five lost one eye; and four had opacities of the cornea. Of one hundred and sixty negroes, thirty-nine lost their sight completely, twelve lost one eye each, and fourteen had more or less considerable opacities.* Here was a case in which no previous contact with infected persons could be traced; yet an apparently genuine purulent ophthalmia made its appearance, and spread with the greatest rapidity. We may fairly conclude that the vitiated atmosphere which these persons breathed, the depression of spirits, the bad food, and the want of attention to cleanliness, are sufficient to account for it.

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* *Treatise*, &c. p. 9.

In the limited sense to which I have now adverted, purulent ophthalmia may be considered contagious; but I do not believe that it is an active, virulent, or certain poison; and still less that it is a specific contagion of Egyptian, African, or Asiatic origin. The term *Egyptian* is improperly applied to it, inasmuch as the disease has appeared in various countries without any suspicion of contagion derived from Egypt. I cannot help thinking that it has existed in this country long before our intercourse with Egypt. Its not having been described does not prove its non-existence: the distinction between small-pox and measles, and between the latter and scarlet fever, are not of old date.

In practice, it is the safest course to proceed upon the notion of the complaint being contagious; and, acting upon that notion, to prohibit the use of the same sponges, utensils, or linen, or any other thing capable of communicating the disease from one to the other, just as if the contagious nature were decidedly proved.

Treatment of purulent ophthalmia.—The violent inflammation, which frequently accompanies the disease, and the consequent serious danger of the organ, have naturally influenced the indications of treatment, which have been founded too much on this partial view of the subject. Antiphlogistic measures, although capable of removing the inflammatory symptoms, which are present in some instances, cannot remedy the affection of the palpebral conjunctiva, which is the source of those symptoms. The latter object must be accomplished by other means. I shall consider separately the violent and the milder forms of the complaint, as different therapeutic principles are applicable in the two instances.

Treatment of acute purulent ophthalmia.—Our object is to arrest the violent inflammation of the conjunctiva, to prevent its extension from that membrane to the cornea. Blood should be taken from the arm, and in large quantity, so as either to influence the circulation decidedly, or to produce syncope. You will derive more benefit from one venesection of this kind than from the repetition of smaller ones. Bleeding in the ordinary quantity, and that repeatedly, had been extensively employed in the English army without any decided benefit, when the increased prevalence of the disorder, together with its violent nature and destructive consequences, rendered it necessary to adopt measures of greater efficacy. General depletion was now employed much more freely, and with corresponding advantage. It was resorted to in the early stage of the disease, and the quantity was regulated by the effects produced on the system. "The diminished vascularity," says DR. VETCH,* "is the first effect which ensues, and before the end of the operation the eye will often become nearly of its natural appearance. The cessation of all uneasiness should be the *sine qua non* of stopping the flow of blood. This, in a robust man, will often not be obtained until thirty or forty ounces have been taken away; and in a few deliquium will take place before this is effected; one or other of these effects should always be procured." If, which rarely happened, the disease assumed its violent form in spite of this treatment, the same means were repeated. In this state, fifty or sixty ounces must be taken away to relieve the pain or bring on syncope; "but we can always rely with certainty on the benefit which will ensue when either of these effects is produced. In every case where such practice is employed, however violent the tendency of the disease may be, its destructive termination will infallibly be prevented, and with much less expense to the patient, than by smaller and more frequent bleedings."†

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* GUILLIE, *Bibliothèque Ophthalmologique*, vol. i.

DR. VETCH observes further, that this plan of free depletion had a remarkable influence over the symptoms of the second stage. "The palpebræ were no longer subject to the same degree of eversion, the quantity of pus was diminished, and in no case did granulation become a troublesome symptom. The swelling of the conjunctiva was less vascular, and appeared like watery vesication; the attacks of pain were shortened and less regular in their recurrence." Besides, therefore, the actual reduction of the numbers in which the disease advanced to the second stage, the symptoms were also rendered less violent by the early adoption of the treatment recommended. This practice, which has so fully met the exigency of the case, has not, perhaps, for its decision and efficacy, a parallel in the practice of medicine; and every person who has seen it employed, is sufficiently convinced of its propriety; but those who have experienced the mortification of seeing every other means unequal to combat the disease, are best able to express a just sense of its benefits."[*]

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* *Account*, &c. p. 100.

† *Ibid*, p. 101.

Rust, who, like Dr. Vetch, had soldiers for his patients, a circumstance that must be borne in mind when the amount of depletion is considered, found it necessary to take two or three pounds of blood in order to produce the requisite effect. He also insists on the importance of resorting to this active treatment as early as possible.[†] Mueller[‡] observes to the same effect, that the quantity of blood to be drawn must be determined by individual circumstances; that pain, so far as it depends simply on inflammation, should be removed, and that vascular turgescence of the eye and lids should be visibly reduced: that these objects may be accomplished in one individual by taking a pint, while in others it may be necessary to take two or three pints, or even more. It may be necessary to repeat the venesection, and if the symptoms continue urgent, it should be done without delay.

Rust[§] speaks very favourably of temporal arteriotomy, which was performed with the most favourable results more than a hundred times during the epidemic in Mentz. I agree with Walther[||] in the opinion that venesection will do all the good that loss of blood can accomplish; and I consider it preferable to arteriotomy for obvious reasons. In the practice of Dr. Vetch[¶] "the blood was sometimes taken from the jugular vein and temporal arteries, without any superior advantage. From the great ease with which the quantity of blood can always be obtained from the veins of the arm in a given time, they were generally resorted to."

After venesection, cupping from the temple and leeching may be employed. In a severe case, after bleeding the patient largely from the arm, apply twenty or thirty leeches round the eye, and repeat them quickly.

Scarifications, whether superficial or deeper, are objectionable, as in all cases of acute ophthalmia. The wounds thus inflicted increase the local irritation; and the quantity of blood furnished by them is too inconsiderable to compensate this disadvantage.

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[*] *Lib. cit.* p. 104, 105.

[†] *Die Aegyptische Augenentzündung*, pp. 212, 216.

[‡] *Erfahrungssätze*, p. 122.

[§] *Lib. cit.* p. 213.

[||] *Lib. cit.* p. 124.

[¶] *Lib. cit.* p. 102.

Walther recommends very strongly the practice of cutting out a large piece of the swollen conjunctiva, either from the eye-lid or the globe, after general bleeding.[*] Several drams of blood will flow from such an incision with great relief of the local symptoms. He recommends the removal of as large a piece as can conveniently be cut out, observing, that although such a wound is large when first made, it appears as a mere line after the inflammatory tumefaction of the membrane has subsided.[†] He equally approves of this proceeding in the subsequent stages of the complaint.

Brisk aperient medicines in the first instance, and afterwards milder aperients, with reduced diet and rest, must accompany the measures just described. Diaphoretics and pediluvia may afford some assistance.

After depletion blisters may be applied to the nape; and the blistered surface may be dressed with savine cerate.

Local applications.—From the well-known efficacy of cold in reducing vascular action, and consequently lessening effusion and swelling, applications of this kind may be expected to prove most advantageous in purulent ophthalmia; and that they are so is proved by the concurrent testimony of those who have treated the complaint most extensively. I believe, with **Rust**[‡] and **Mueller**,[§] that nothing answers the purpose better than cold spring or river water, with which the eyes may be frequently cleansed: it may be used, too, if it is found comfortable, more or less constantly as a lotion, by means of light linen rags dipped in it and frequently renewed; they should cover the forehead as well as the eyes. **Mueller** too employed with advantage, in the very comment of active inflammation, water rendered still colder by putting pieces of ice into it. A fresh portion of water should be used for each cleansing of the eyes.

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[*] An analogous proceeding is advised by Scarpa in cases of chemosis generally, with the view of letting out that supposed effusion of blood under the conjunctiva, which he regards as the cause of the chemosis. The operation "consists in the circular excision of the projecting portion of the conjunctiva with the curved scissors, at the part where the cornea and sclerotica unite; by means of which, not only the whole of the blood which is extravasated under the conjunctiva is discharged, and with immediate relief to the patient, but also that which, notwithstanding the abundant general evacuations of blood, might still greatly distend the vessels of this membrane."—Mr. Briggs' *Translation*, p. 148.

[†] *Lib. cit.* p. 126—130.

[‡] *Lib. cit.* p. 211.

[§] *Lib. cit.* p. 128—130.

Walther* also extols highly the beneficial effects of cold water. "In the severer forms of the disease we apply cloths dipped in cold water, not only to the eyes and forehead, but also to the entire head. This plan is continued in some cases from fourteen to twenty-one days with the best result; with great alleviation of the pain, rapid subsidence of the swelling, and diminution of the puriform discharge." In several obstinate cases I have had cold water poured over the head once or twice a day with good effect. "The cold douche† has also been used in some instances with surprising benefit." Dr. Gericke, who had the charge of an ophthalmia hospital, gives the following account. "The cold douche was resorted to in conjunction with powerful antiphlogistic means. It was used in all cases attended with chemosis, and it never failed to give immediate relief. When the affection was obstinate, it was often repeated. The patient was seated in a bathing-tub half full of warm or cold water: perhaps the former is preferable. Cold water was then poured over the head from a height of five feet: it produced a great shock. The douche was repeated three or four times; the patient was then put to bed; considerable perspiration ensued, with relief from pain."

Warm fluids, fomentations, poultices, and steam, increase the heat, and thus augment the vascular disturbance. When, under the continued progress of the inflammation, the application of cold becomes painful, the water may be used tepid for cleansing the eye. Unless there should be spasm of the lids, warm fomentations should not be employed; though I have known instances in which patients have found them agreeable. If the continuation of cold cannot be borne, let local means be laid aside, except for ablution: it is not absolutely indispensable to keep the affected organ constantly covered with wash or fomentations.

The free use of mercury is recommended by Rust,‡ when the inflammation is advancing in spite of active antiphlogistic treatment. My experience corresponds with that of Vetch[*] and Walther,[†] who have seen salivation produced in many instances without the smallest advantage.

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* *Lib. cit.* p. 130—133.

† Cold affusion was resorted to with considerable success by Mr. Peach, when the ophthalmia prevailed in the 2nd battalion of the 52nd. "In some cases where, after the very free use of the lancet, the patients felt hot and restless, and in the very few cases where these symptoms occurred in the first instance, the usual benefits resulted from its employment."—Dr. Veitch, *Account*, &c. p. 115.

‡ *Lib. cit.* p. 219.

The means before recommended must be continued and repeated till the bright redness of the conjunctiva and its tumefaction are lessened, and till the pain is gone.

The membrane will now be paler, with a relaxed and flabby appearance, the discharge still continuing abundant; we must alter the plan of treatment, and use astringents, allowing better diet, and perhaps tonic medicine. By the judicious employment of such means, after the violent inflammation has been subdued, we shall remove that diseased condition of the conjunctiva which causes so much inconvenience to the patient, so much trouble and perplexity to the practitioner. Of astringents, the solution of alum comes the first in order, being employed in the same way as in the infant. The oxymuriate of mercury may be used (g. j—ij. ad ℥j.) Mueller[‡] particularly recommends two formulæ; 1st, one, two, or three drops of sulphuric acid in an ounce of water; 2ndly, two or three grains of acetate of copper in the same quantity.

The preceding milder applications may be followed by solutions of the nitrate of silver or sulphate of copper, (g. ij—vj. ad. ℥j.,) or the undiluted liquor plumbi. Of these fluids, one, two, or three drops should be carefully introduced between the lids, once or oftener in the day, the eye being still occasionally cleansed and bathed with the alum lotion. The citrine, or red precipitate ointment, may be applied to the edges of the lids at night.

Mr. Briggs[§] has found the oleum terebinthinæ to be the most effectual means of checking the profuse discharge in purulent ophthalmia. He introduces "a minute quantity of it, proportioned to the age and sensibility of the patient, on the point of a camel-hair pencil between the eye-lids every morning, the eye being immediately afterwards immersed or bathed freely with cold water and a sponge, until the uneasiness and sense of heat which it produces in the eye and surrounding parts is allayed, which usually continues for some minutes."

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[*] *Lib. cit.* p. 88.

[†] *Lib. Cit.* p 138.

[‡] *Erfahrungssätze*, p. 143.

[§] Note to his translation of Scarpa, p. 170.

We must carefully observe the effects of astringents in the first instance; they cause more or less pain, which goes off, leaving the eye relieved and stronger. But if the pain should continue, and the redness be increased, we must leave them off and return to the antiphlogistic means; for the same reason we must suspend them at any period, if relapse of inflammation should occur.

Better diet, exposure of the organ to light as much as it will bear, and exercise in the open air, may be combined with this change of local measures. Confinement to the house does not seem advantageous at any period of the complaint, while free exposure of the inflamed eye to cool air, and even general exercise, instead of being hurtful, as patients and their friends suppose, have generally been found decidedly beneficial. DR. VETCH is even disposed to recommend the delay of a journey, in the commencement of the disease, if the eye be freely exposed to the air, and the weather favourable. He says that when the second stage has commenced, with chemosis and purulent secretion, he has never seen any but the best effects from change of place. "Soldiers, who have commenced a march with the disease completely formed, though exposed to heat, dust, and fatigue, and not abstaining even from intoxication, are invariably better at the end of the journey than when they set out. The instances of this fact, which I could adduce from my own observation, are innumerable; and I am informed by MR. MURRAY, surgeon to the forces, that so strongly did he observe the beneficial effects of exposure to the air, when a great number of men affected with the disease was sent under his care to the interior of Sicily, that he was induced to march them from one place to another, with a view solely to the good effects which he saw to result from it."[*]

If tonics should be required, which will seldom happen, we may have recourse to bark, cascarilla, and the mineral acids. In the irritable state, which remains after considerable depletion, with the eye suffused and intolerant of light, with considerable pain not referable to inflammation, and often periodical, MUELLER[†] employed the remedy first mentioned in substance, repeating it at short intervals: he used it generally in the treatment of the contagious ophthalmia, after depletion, if there was no decided contra-indication.

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[*] *Practical Treatise*, p. 208.

[†] *Lib. cit.* p. 137—141.

The internal use of opium has been resorted to as a remedy for pain; and it may sometimes be used with advantage after depletion, either alone or in the combination of Dover's powder. Some have considered its local use advantageous before proceeding to astringents, or when they cannot be borne. The forms employed have been the aqueus solution as a collyrium; vinum opii dropped into the eye; and the substance alone, or combined with mercurial ointment, rubbed over the brow.

Spreading ulceration of the cornea, attended with debility, will require a decided tonic and stimulating treatment; that is, good diet with porter, or wine, bark, or the sulphate of quinine, and local astringents.

In that peculiar kind of ulceration, where there is a deep groove in the margin of the cornea, after stopping the inflammation, raise the general powers by good diet and tonics, and leave the ulcer to nature. The very diligent use of astringents and stimuli, particularly the stronger ones, often does mischief. The most rapid recoveries I have seen in extensive ulcers of this kind, have been where no local means but simple tepid ablutions have been employed.

In that ectropium of the lower lid, which remains after the inflammation is gone, and presents a large red fleshy mass, without much sensibility, the nitrate of silver in substance may be freely used. A few applications of it soon remove the swelling and restore the lid to its natural position.

There are, in short, two points for us to bear in mind in treating acute purulent ophthalmia; first, to check inflammation by antiphlogistic means, and then to employ astringents. If we proceed on this plan, we shall prevent that chronic thickening and granulation which are so obstinate and troublesome.

The free use of powerful astringents, such as the sulphate of copper, the subacetate of lead, and a strong solution of nitrate of silver, or an ointment containing the same substance, has been recommended in the commencement of purulent inflammation, to cut short the complaint. The remedies thus employed come into contact with the very seat of disease, and act directly on the vessels, which are in a state of disturbance; hence we derive a rational explanation of their beneficial operation when the disorder is confined to the mucous lining of the palpebræ, or in its first degree of extension to the conjunctiva of the globe.

I have already quoted the experience of MR. MELIN[*] on this subject.

Very strong testimony in favour of the astringent plan of treatment in ordinary purulent ophthalmia is given by DR. O'HALLORAN,[†] who had enjoyed ample opportunities of observing the disease, as an army-surgeon, for many years, and in various climates. He had become dissatisfied with the antiphlogistic treatment, from having found it frequently either insufficient or injurious, and was hence led to use astringents, not only in the early stage of the disease, but when the purulent discharge and chemosis were fully established. He employed the sulphate of copper in substance, rubbing with it the inner surface of the eye-lids after everting them, or he dropped into the eye the ten grain solution of nitrate of silver; and generally used one or the other once a day. He gave purgatives and applied fomentations. If the symptoms indicated that the internal parts of the organ were affected, he directed the application of leeches. After mentioning a case treated successfully with the sulphate of copper and the caustic solution, he adds, "The foregoing case, with some hundreds on record, of the different varieties, show with what efficacy and safety blue-stone may be applied to the eyes when under disease: its effects in removing the affection of the parts and allaying the irritation are remarkable. I can safely say, that abstraction of blood will be rarely necessary in this disease, if the plan recommended be strictly attended to; and I moreover am of opinion, that if any inquiry be instituted amongst the army-surgeons, it will be found that those, who used the greatest depletion, were the least successful practitioners, and that sloughing, ulcers, &c. more frequently succeeded the evacuating plan, than when the patient was partly left to nature."

Treatment of purulent ophthalmia in its milder form.—If inflammation, although not considerable, should have occurred in the conjunctiva oculi, or if we think its occurrence probable, it will be proper to employ moderate antiphlogistic treatment, such as abstraction of blood by cupping or leeches, cold washes, regulated diet, and aperients. When active disturbance is subdued by these means, the local use of astringents to the diseased palpebral linings is necessary, and must be continued until the morbid change already described shall have been completely removed. The liquor plumbi subacetatis undiluted, the solutions of alum, sulphate of copper, and nitrate of silver, of which the strength must be gradually increased, dropped into the eye once or twice a day, and the red precipitate or citrine ointments to the ciliary margins, are the best remedies for this purpose. Confinement within doors is not necessary; on the contrary, exercise in the open air, and exposure of the eyes to it for some hours in the day, particularly in warm or mild weather, is decidedly advantageous. The protection of a shade must be used, if the light should be too powerful. The army surgeons have found that this inflammation, even in its more active form, instead of being aggravated, has been decidedly checked by free exposure to the air; and thus that patients have been much better after marches, even in bad weather.

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[*] See page 157.

[†] *Practical Remarks on Acute and Chronic Ophthalmia, and on Remittent Fever*; London, 8vo. 1824. Part I. ch. 1.

MUELLER strongly recommends, from long experience, mercurial applications in the form of ointment, which I have not seen employed. These are the hydrargyrum oxydulatum nigrum,[*] which seems to be a mild dark grey or blackish oxyd of mercury, in the proportion of four or six grains to one dram of lard; the white precipitate[†] in the proportion of seven or eight grains to the dram; or the red precipitate. These ointments are to be smeared over the diseased surface once or twice daily If the eye does not bear their application in that manner, we are advised to rub the former, sometimes with the addition of opium, into the eye-brow, forehead, or cheek; or to apply over the lids a piece of linen thickly spread with it.[‡]

As the complaint is now strictly local, the above-described topical measures are the best calculated to remedy it. That MUELLER[§] should have found blisters, issues, and setons unavailing, need not surprise us.

Treatment of the diseased palpebral conjunctiva in the chronic state.—When purulent ophthalmia has been neglected or inefficiently treated, and when the eye has consequently been repeatedly inflamed, the palpebral linings become thoroughly altered in structure, and we cannot be surprised that it should be difficult, and indeed hardly possible, to restore their healthy state. For this purpose the use of local means still more active than those already specified, has been recommended. This condition of the parts has been called by

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[*] *Neueste Resultate*, p. 50.

[†] *Ibid.* p. 42.

[‡] *Ibid.* p. 52.

[§] *Ibid.* p. 63.

English writers, the granulated state of the eye-lids. It is hardly necessary to observe that this phrase, and the term granulations, which is so frequently employed in the account of purulent ophthalmia, merely denote the external resemblance of the morbid structure to the surface of a healing ulcer, without indicating any affinity in origin and nature.

A very important effect produced by this state of the lids is vascularity and opacity of the cornea. The mehanical friction of the granulations on the surface of the cornea causes its vessels to be enlarged, so that the texture of its conjunctival layer is loosened and thickened; hence haziness, a nebulous state, or more considerable opacity is produced. This change must be distinguished from the effects of active inflammation. In the present instance, the following is the order of events:—1st. Disease of the palpebral lining; 2ndly. Acute inflammation of the conjunctiva; 3rdly. Full development of the granular surface, with thickening and hardening of the membrane; 4thly. Vascularity and opacity of the cornea. The vascularity may proceed to the extent of covering the cornea with a net-work of red vessels; and its mucous covering may be so loosened and thickened as to exhibit the state, technically called *pannus,* in which the boundary of the cornea can hardly be seen.

With these changes may be combined the results of severe inflammation; viz. leucoma, synechia anterior, prolapsus iridis, staphyloma, amblyopia. Sometimes there is active inflammation of the membrane, with blennorrhœa; for the eye is weak and irritable, and subject to relapse of inflammation from slight causes.

In the first place, we must remove inflammation by suitable means. The eye should be protected from external excitement without constantly covering it, and certainly without confining the patient to the house, which would be decidedly prejudicial.

Excision of the granulations, either by knife or scissars, was practised at one time; and a dispute arose which method deserved the preference. This was terminated by the entire abandonment of the proceeding, which had been found injurious.

Walther,[*] however, still advocates the plan of excision as the most effectual means for removing the preternatural growth of the conjunctiva, to which purpose he has found caustics inefficient. He observes, that the granulations will be reproduced, so that it will be necessary to repeat the operation, which causes no local excitement, so that it may be speedily followed by the use of astringents or escharotics.

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[*] *Lib. cit.* p. 128, 129.

Supposing the eye to be free from irritation, and the disease thus reduced within its original boundaries, we may try, even in these chronic cases, the astringents already specified. If the nitrate of silver should be used in strong solution, for instance, twenty or thirty grains to the ounce of water, it should be applied to the granulated surface with a camel-hair pencil, the lids having been previously everted.

If these means should not be sufficient, we must proceed to the use of escharotics, bearing in mind the powerful action of these substances, and the delicate organization of the part to which they are to be applied. We should begin with the weaker, and proceed to the stronger applications. To prevent their injurious action on the healthy conjunctiva, we should take care that they touch only the diseased part. We should therefore evert the lids, and keep them everted until the effect of the application is produced. The surface, when thus exposed, may be freed from moisture before the escharotic is applied; when its action is over, the membrane should be carefully washed to remove any remaining portion of the application, before the lid is restored to its natural position. The smearing with oil, which has been adopted for the same purpose, is not more efficacious than ablution with a soft sponge and simple water. The substances may be applied in solution, in powder, or in substance; the first and last forms are the best. Change of application is often advantageous.

The acetate of copper in concentrated solution, or in powder, is one of the weaker means. The sulphate of copper has been used in powder and in substance; in the latter form it is perhaps the best remedy of the kind. The whole of the granulated surface should be gently rubbed until it assumes a dirty bluish tinge; after waiting a minute or two, the lid should be carefully washed and restored. The nitrate of silver is employed in saturated solution, or in substance, the prominent points being lightly touched in the latter case. The nitric and muriatic acids, diluted with three parts of water, have been recommended. These may be applied, like the solution of lunar caustic, with a camel-hair brush.

These strong applications, as might be expected, produce and aggravate local excitement, causing pain often very severe, redness, swelling, and increased discharge. They must not be repeated until these effects have gone off, that is, until the third or fourth, or from that to the sixth or eighth day. Longer delay, and antiphlogistic treatment, are sometimes necessary. In the interval of the escharotics, some of the astringent solutions already mentioned may be employed.

I could not adduce much personal experience in favour of this escharotic treatment; having found more benefit from antiphlogistic means in the first instance, and the subsequent use of astringents, such as the solutions of alum, sulphate of copper, or lunar caustic, and the liquor plumbi, with regulation of diet and the digestive organs, residence in pure air, exercise, repose, or moderate use of the organ. With such means I have sometimes advantageously combined issue in the temple. Great and rapid improvement has occasionally been observed when the general plan above mentioned, with soothing local applications, has been substituted for strong astringents and escharotics. The latter should not, I think, be employed, until the gentler measures have been tried, and then very cautiously. The great tendency to relapse must be borne in mind; should active mischief return, the escharotics must be laid aside, and the milder plan resumed.

WALTHER,* whose experience in this complaint has been much more extensive than mine, has come to the same conclusion respecting the use of escharotics. "The benefit derived from them," he says, "is on the whole inconsiderable; even when methodically and cautiously employed, they either do not effect a complete cure, or bring it about very slowly. I used in the ophthalmic hospital of Bedburg the means recommended by RUST, which are chiefly of a powerful escharotic kind, in numerous cases, according to the rules he has laid down, but without the expected benefit. Most of them are so strong that the eye, even in its relaxed state, will not bear them without experiencing inflammatory reaction. We therefore again reduced our ophthalmic formulary into a small compass, after having enlarged it without advantage. I am indeed astonished when I see one of the most delicate organs attacked with a series of applications so powerful and destructive, from corrosive sublimate to arsenic. The number of these local remedies is calculated to excite distrust. When a disease can be easily and safely cured, the remedies are few, simple, and recommended by reason and experience. They become multiplied in proportion to the obstinacy and tediousness of the complaint."

The presence of various changes produced by previous active inflammation, such as ulcer, opacity, nebula, vascularity of the cornea, pannus, prolapsus iridis, partial staphyloma, affords no contra-indication to the use of escharotics or astringents. On the contrary, when these affections have long resisted other means, they often are either greatly improved, or rapidly disappear under the treatment above described.

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* *Lib. cit.* p. 148, 149.

After the use of escharotics, the conjunctiva does not regain its normal state; it exhibits traces of the former affection, which, however, do not interfere with its function. It is thicker, and has a leathery appearance, with a darker red colour than in the natural state, and sometimes we observe whitish cicatrices.

CHAPTER X.

GONORRHŒAL OPHTHALMIA.

Three distinct forms of ophthalmic inflammation occur in conjunction with, or dependence on, gonorrhœa; namely, 1st. *Acute inflammation of the conjunctiva*;—2nd. *Mild inflammation of that membrane*;—and 3rd. *Inflammation of the sclerotic coat*, sometimes extending to the iris.

SECTION I.

I. *Acute gonorrhœal inflammation of the conjunctiva; gonorrhœal ophthalmia; blepharophthalmia*, and *ophthalmia gonorrhoica vera* of Beer.

The name of this affection sufficiently indicates its nature. It is a violent inflammation of the mucous membrane of the eye-ball and lids, attended with a profuse discharge of fluid, closely resembling in all its sensible characters that which issues from the inflamed urethra in gonorrhœa, and occurring in some kind of connexion with that complaint. It is the most violent and rapidly destructive inflammation to which the eye is subject; and, fortunately, it is one of the most rare. It sometimes destroys the eye within a very short time; and the organ is often irreparably injured before the patient seeks for surgical relief, especially when the affection occurs in the lower classes.

Symptoms and progress of acute gonorrhœal ophthalmia.—This affection presents all the characters of purulent ophthalmia in their fullest development. There is the greatest degree of vascular congestion, the most intense and general external redness; excessive tumefaction of the conjunctiva; great chemosis, with corresponding swelling of the palpebræ; and profuse yellow discharge. In the first stage of the disease, which is short, the inflammation is confined to the conjunctiva, and is attended with soreness and stiffness, with the sensation of sand or dirt in the eye, and with more or less uneasiness on exposure to light or using the organ. The affection soon extends to the cornea with severe and agonizing pain in the globe, orbit, or head, augmented to intolerable suffering on exposure to light, and with febrile disturbance of the system of inflammatory character. The danger to the organ is now most serious and imminent; indeed, when the disease has thus advanced from the mucous membrane to the globe itself, we can hardly expect by any kind of treatment, to avert entirely its destructive consequences. The violent inflammation, which causes the yellow puriform discharge from the mucous surface of the conjunctiva, produces effusion into the cellular texture connecting it to the surrounding parts. Hence the general swelling of the membrane, and that more considerable tumefaction on the front of the sclerotica, round the cornea, which is called chemosis. The latter is often so considerable, that the swelled conjunctiva overlaps the cornea all round, so as nearly to hide it. Similar effusion takes place into the cellular texture of the eye-lids, enlarging them considerably, more particularly the upper, which hangs over and sometimes completely covers the lower. This palpebral swelling is sometimes œdematous, with the integuments but little redder than natural; in other instances it is firmer, with the skin, particularly of the upper eye-lid, bright red. The latter state denotes more active inflammation, and greater danger to the organ. The chemosis, and the swelling of the lids, make it often difficult, and sometimes impossible to get a clear view of the cornea. Although it is desirable to do this, in reference to prognosis, when we first see the case, we should not persist in our efforts at the risk of augmenting the inflammation, or the patient's sufferings. The œdema of the eyelids declines in the progress of the affection, and then one or both of them may become everted, the convex edge of the tarsal cartilage being pushed forwards by the swoln conjunctiva.

The chemosis and the tumefaction of the eye-lids are analogous in their nature and mode of production to that swelling which takes place in the neighbourhood of any active inflammation. That the former should have been referred heretofore[*] to the deposition of venereal matter in the cells of the part, and that incisions should have been recommended for its evacuation, will not surprise us; but we could hardly have expected to find such a mode of accounting for the phenomenon adopted by Beer and Richter. The swelling of chemosis, according to the former, arises from the effusion of gonorrhœal matter under the conjunctiva; he mentions the practice of making incisions for the discharge of this matter, and represents that from such incisions there flows out a purulent fluid, or a yellowish acrimonious ichor. He says that gonorrhœal matter is sometimes seen at the very beginning in the chambers.[†] "Sometimes," says Richter,[‡] "the conjunctiva swells up round the cornea, as in chemosis; this swelling depends entirely on an effusion of true gonorrhœal matter into the cellular texture and the conjunctiva, and the matter flows out on making incisions through that membrane. Sometimes gonorrhœal matter is found in the anterior chamber."

The inflamed membrane exhales at first a thin whitish mucus in small quantity; as the inflammation proceeds to its full development, the discharge becomes thicker, yellow, and abundant; the yellow tint and the quantity of the exhalation being in proportion to the violence of the inflammation. When the latter is at its height, the discharge closely resembles in its appearance, and in the stain communicated to linen, that which proceeds from the urethra in venereal gonorrhœa.

Although the pain is generally most severe, both in the eye and in the head, as in other instances where the dense and unyielding texture of the cornea is the seat of inflammation, and although patients often complain of burning pain, of tension as if the eye would burst, of deep-seated and intense agony, with extension of these distressing and almost intolerable sensations to the brow, forehead, and head generally, there are some instances in which little or no pain is experienced.

The symptoms of acute gonorrhœal ophthalmia are not equally violent through the whole course of the affection: it begins with swelling and increased redness of the conjunctiva, and some pain in the organ; then the puriform discharge takes place, with increased uneasiness; and, lastly, the inflammation extends to the cornea, with great aggravation of suffering. Thus the course of the affection may be divided into three stages, of which the limits cannot be marked very accurately. In the first, there is vascular distension and swelling of the membrane, with swelling of the lids; the commencement of the second is marked by the occurrence of the puriform discharge, and that of the third by extension of the inflammation to the cornea. The duration of each of these varies in different instances according to the constitution and state of health of the individual, and perhaps still more according to the nature of the treatment adopted. This variety, however is observed less in the first and second than in the third stage; the two former, and more particularly the first, usually passing off very rapidly. In one case, the second stage may be said to have begun in twenty-four hours from the first perception of uneasiness: the lids were red and swoln at that time, and there was thin puriform discharge. In thirty-six hours the swelling was so great, that the eye could not be seen, and there was profuse yellow discharge, while severe pain of the eye and head denoted clearly extension of the disease to the cornea. In another instance, the first stage occupied about thirty-six hours, and the second between three and four days. In a third, pain and weakness were first felt in the eye on the 1st of November, and on the 6th I found that the cornea had sloughed.

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[*] Astruc; Lib. iii. c. 3. Camerer, *Dissert. de Ophthalmia Venerea.*

[†] *Lehre der Augen-krankheiten.* 1st Edition, vol. i. p. 294, 295.

[‡] *Anfangs-gründe*, vol. 3, p. 63.

Effects of the inflammation.—The immediate effects of the inflammation on the cornea are sloughing, suppuration, ulceration, and interstitial deposition; while the consequences to which these changes lead more remotely, are, escape of the humours and collapse of the globe, obliteration of the anterior chamber, and flattening of the front of the eye, staphyloma, prolapsus iridis, obliteration of the pupil, corneal opacity, and anterior adhesion of the iris.

I have spoken of the cases in which the *cornea* is said to *burst* under purulent ophthalmia, see p. 187.

The cornea becomes dull and hazy before it sloughs, or indeed before undergoing any of the changes just enumerated. Its transparency and polish are completely destroyed, when it has sloughed; and it is converted into a dirty, yellowish, or brownish opaque substance, which is immediately recognized as deprived of life. At first it looks like a portion of wetted leather; it is soon separated from the living parts, when it has a loose, soft, and ragged appearance. As the lens and capsule, which are exposed by this separation are transparent, the patient sometimes recovers, for a short period, tolerably good vision. After the slough is detached, the chambers of the aqueus humor may be exposed by ulceration; the humours will then escape, the emptied coats will collapse, and the globe remains permanently shrunk in the socket. More commonly, although the whole cornea seems to slough, the entire thickness does not separate, and the anterior chamber is not exposed. The interior layer of the cornea, or the membrane of the aqueus humor, is left, and is soon pushed forwards by the iris, which forms an irregular brownish, and dirty-looking protuberance on the front of the eye. As the inflammation declines, this protuberance recedes, until it disappears altogether, the front of the eye remaining flattened, and being formed by the iris, covered by a thin, smooth, and more or less opaque pellicle, through which the fibres of the iris may be partially seen, giving it a somewhat streaked appearance. Sometimes the iris is permanently protruded, and forms a dark, more or less smooth, protuberance, partially subdivided on the surface, (*Staphyloma racemosum.*)

The separation of the slough, when it has been partial, leaves an ulcerated surface, which is soon raised into a vesicular protuberance, consisting of the membrane of the aqueus humor, with the iris, which has become adherent during the previous inflammation of the cornea (*prolapsus iridis.*) This shrinks as the inflammation declines, and the regular figure of the cornea is restored; but the iris remains adherent, and is covered only by a thin pellicle, which is partially opaque, while the boundary of the adhesion presents a deeper opacity in the cicatrix of the corneal laminæ. If a considerable portion, such as one-half or one-third of the cornea, should have perished, a permanent tumour is sometimes formed, consisting externally of the opaque cornea, and internally of the adherent iris; its cavity, which is an extension of the anterior chamber, being filled with aqueus humor: this is termed *partial staphyloma*, and differs from prolapsus iridis, or complete staphyloma, only in size. I have seen it occur in both eyes of the same individual, with but little injury to sight, as the protrusion of the iris hardly interfered with the pupil.

Suppuration of the cornea may be general or partial: it is usually the former. The cornea first becomes white, and then assumes a yellow colour. The effused substance is not a fluid, nor is it collected into a cavity; it is a thick viscid matter deposited in the texture of the cornea. Ulceration takes place, and exposes an opaque yellow substance, which looks like ordinary matter, but it cannot be wiped off. The ulcerative process extends until this is removed. If the whole cornea should be destroyed, the humours may escape, and the globe will shrink. Or, the humours may remain, and the tumid conjunctiva scleroticæ contract from the circumference towards the centre of the space left vacant by the cornea, until it completely fills that space, when the eye appears like a red fleshy mass, in which even the original situation of the cornea cannot be distinguished. The ulceration of the suppurated cornea may penetrate the anterior chamber at different parts, at each of which the iris may protrude, the front of the organ remaining ultimately flattened.

When ulceration takes place without previous suppuration, it generally attacks the margin of the cornea, and extends rapidly through the laminæ, so as to form a deep trench, seldom occupying less than one-third, often one-half, or two-thirds of the circumference, and sometimes extending round the whole circle. In the latter case, the portion insulated by the ulcerative process sloughs. On the sides of this ulcerated trench, the laminæ of the cornea may be often seen very distinctly. BEER says that they turn up like the leaves of a book, which has been much read. If the ulceration should not occupy more than two-thirds of the margin, the vascular supply of the cornea will still be carried on, and the mischief may be repaired. As the margin of the cornea is covered by the swollen conjunctiva, these ulcers are at first concealed from view, and we do not know of their existence until the chemosis begins to subside. When the ulcer has gone through the corneal laminæ, the membrane of the aqueus humor may rise as a transparent vesicle in the cavity, (*ceratocele, hernia corneæ,*) or it may be pushed forwards by a protruding portion of the iris. The ulcerative process may penetrate the anterior chamber, when the iris will either fall against the opening, or be pushed into it and block it up. If the ulcer, whether it should have arisen from the separation of a slough, or have occurred in the manner just described, should be spreading, the inflammation remaining unchecked, its surface is whitish, and ragged, or flocculent; or of a dirty yellowish cast, with surrounding haziness. When the inflammation subsides, it becomes transparent. The commencement of the restorative process is marked by the surface of the excavation assuming a light greyish tint, with a jelly-like appearance. A soft semi-opaque substance slowly fills up the breach, when the surface becomes smooth, and the regular figure of the cornea is restored. No secretion of pus is observed, either during the stage of ulceration or that of reparation; the latter process is slow, several days often elapsing without any sensible change in the size or appearance of the ulcer. The same process of contraction takes place here, as after the cicatrization of other ulcers, so that the size of the opaque cicatrix is much less than that of the previous corneal ulcer; and as these ulcerations take place on the circumference of the part, one that has been of considerable size leaves a mark that is only observable on close inspection, while, where the ulceration has extended over the edge of the pupil, the cicatrix may leave that aperture quite unobstructed.

The existence of the ulcer makes no difference in the kind or degree of pain during the active period of the disease: no pain is felt when the inflammation is stopped, although a large ulcer may still exist.

When interstitial deposition takes place, the corneal laminæ are the seat of the mischief; and the opacity thus produced is of the dense kind called *leucoma* or *albugo*. It is usually accompanied with anterior adhesion of the iris (*synechia anterior*.)

Contraction or obliteration of the pupil may occur in consequence of protrusion of the iris in partial staphyloma, or at the smaller apertures produced by ulceration; or of its adhesion to a leucomatous portion of the cornea.

When the cornea has been weakened by extensive sloughing or ulceration, the iris having previously become adherent to it during the active period of the inflammation, the conditions necessary to the formation of total staphyloma exist; and this accordingly is one of the ultimate consequences of gonorrhœal ophthalmia.

Diagnosis.—Between the highest degree of purulent inflammation, and acute gonorrhœal ophthalmia, there is a near resemblance in the local symptoms. The discharge may be more abundant and thicker in the latter, in which the conjunctiva oculi is more swelled, while the swelling of the eye-lids is more considerable in the former. The peculiar change of structure in the palpebral conjunctiva is an especial character of the contagious ophthalmia; at least, it does not take place in the gonorrhœal. The latter occurs in single instances, and is uncommon; the other affects great numbers of individuals who are living together. The one takes place in persons who have had, or still have gonorrhœa; the other in those free from such complaint, but who have been exposed to the contagion of purulent ophthalmia. Whether the discharge of gonorrhœal ophthalmia would affect the eye of a sound person if applied to it, is not known; but it certainly possesses no indirectly contagious property. In purulent ophthalmia the lining of the palpebræ is first affected, and the disease extends to the mucous membrane of the globe. In a case of gonorrhœal ophthalmia, which I saw at the very outset, the complaint began at once in the conjunctiva oculi. The latter comes on at once with the utmost violence, and proceeds with the greatest rapidity, coming to an end in a few days, either by recovery, or more commonly by destruction of the organ. In the contagious disease there is generally a milder period at the beginning; the disease is in general less rapid and destructive; it goes off and returns again, and thus may last for months or years. In general, gonorrhœal ophthalmia attacks only one eye, while the purulent disease affects both.* The latter may however be confined to one eye, as is proved by the cases quoted at p. 191, while the gonorrhœal form of the disease often attacks the second eye, after a short interval. One eye only was affected in nine out of the fourteen cases, which I have recorded in my *Treatise on the venereal diseases of the eye*. In this disease the cornea is frequently destroyed by sloughing, which does not take place in the contagious ophthalmia. The latter is characterized by the peculiar change of structure in the conjunctiva, and by frightful ectropia consequent on it.

Prognosis.—The violence of the inflammation, its rapid course and the disorganization or changes of structure, which it so speedily produces in the cornea, are attended, under all circumstances, with the greatest danger to sight, which, in a large proportion of these cases, is either lost, or seriously injured. Thus of the fourteen cases which I have related in my treatise, loss of vision took place in nine from sloughing, suppuration, or opacity of the cornea. In two of these one eye was lost, and the other recovered. Sight was restored in the other five, with partial opacity of the cornea, and anterior adhesion of the iris in three of the number. So short a period intervenes between the commencement and the full development of the complaint, that in many instances irreparable mischief is done to the eye before our assistance is required. If we see the complaint in the first or second stage, we may expect to arrest its progress by active treatment; but success does not invariably attend our efforts even under such favourable circumstances. Our prognosis will principally turn on the state of the cornea; if that should possess its natural clearness, the eye may be saved. If it should become hazy and dull, and more particularly if it should have assumed a white nebulous appearance, consequences more or less serious will inevitably ensue. Great swelling of the conjunctiva, more particularly great chemosis, profuse discharge of a yellow colour, and bright redness of the swoln upper eye-lid, are unfavourable circumstances, as indicating a high degree of inflammation. The changes, to which the cornea is liable, do not always destroy sight: their effect depends on their extent and situation. Sight may be restored after partial sloughing of the cornea; and extensive ulceration may occur in its circumference without injury to vision.

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* Dr. Vetch says, "there is not one case in a thousand in which one eye only becomes affected."—*Practical Treatise*, p. 195.

Walther observes that contagious ophthalmia almost always appears in both eyes together, but not in the same degree.—*Lib. Cit.* p. 83.

Eble states that the contagious ophthalmia has not confined itself to one eye in any instance.—*Ueber den Bau*, &c. p. 215.

The inflammation is not equally violent in all cases; and, of course, the prognosis will be less serious in proportion to its comparative mildness.

When both eyes are attacked in succession, the disease is less severe in the second, which, therefore, is usually saved. Sometimes, however, the inflammation is equally violent and destructive in both, and total blindness ensues.

Causes.—In investigating this part of the subject, we have to inquire what is the nature of the connexion between this inflammation of the eye and gonorrhœa? whether the former can be produced by the application of gonorrhœal matter to the organ? If so, whether an individual can infect himself? whether the application of matter from another source be necessary? or whether the infection may occur in both ways? Whether, on the other hand, gonorrhœal ophthalmia may be an example of that peculiar transference of diseased action, which is called metastasis? To some it may appear necessary to examine a previous question; viz. whether there is any connexion at all between the inflammation of the urethra and that of the eye? For Mr.

PEARSON* directly denies the existence of such a connexion, on the ground that, in many thousand cases of gonorrhœa, he had not seen one instance of inflammation of the eye that could be ascribed to the gonorrhœa.

From this statement we can merely infer that Mr. PEARSON had not seen gonorrhœal ophthalmia, which is very strange, when we consider, as he informs us, that many thousand cases of gonorrhœa had fallen under his notice. I may oppose to his negative testimony the positive experience of many competent observers, and the evidence of numerous facts which have come under my own observation.

Whether this dangerous ophthalmia can be produced by the application of gonorrhœal matter to the organ, is a more doubtful point, which the nature of the subject prevents us from settling in the only satisfactory way, that is, by direct experiment.

It is stated incidentally by BEER,† and in the same kind of way by SCARPA,‡ that, if gonorrhœal matter be applied to the eye, it excites only a slight degree of inflammation. These statements are not accompanied by any narratives of cases, or other detailed illustrations, so that we do not know on what kind of proof the assertions rest, nor how the application of the morbid secretion to the eye was ascertained.

Since infectious matter does not produce disease in the same individual, although it is capable of affecting others, analogy would lead us to infer that gonorrhœal discharge applied to to the eye of the same person would not cause gonorrhœal ophthalmia. This conclusion is supported by the result of some experiments made by Dr. VETCH.§ He took matter from the eyes of persons labouring under acute purulent ophthalmia, and applied it in each case to the urethra of the same individual: no disease was excited. But, when he applied the same matter to the urethra of a different individual, it produced a very virulent gonorrhœa. He infers from these experiments, that gonorrhœal matter taken from the urethra and applied to the eye of the same individual would excite no inflammation of the eye. The inference is probable, but not necessary. Because the purulent secretion of the eye does not affect the urethra, we cannot conclude that the gonorrhœal secretion of the urethra will not affect the eye. These morbific influences are not in all instances reciprocal: inflammation of the urethra often causes inflammation of the testicle, but the latter seldom or never produces the first. Dr. VETCH further mentions, that an hospital assistant, named SMITH, applied gonorrhœal matter to his own eyes with impunity. When we consider how this matter is diffused over the linen of patients, both male and female, how often the fingers must be smeared with it, and how inattentive to cleanliness the lower classes are, we cannot help concluding that gonorrhœal discharge must be often applied to the eyes of the same individual; yet gonorrhœal ophthalmia is comparatively rare.

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* In a letter to Mr. BRIGGS, printed in his translation of SCARPA's *Treatise*, p. 164—166, note.

† *Lehre*, vol. i. § 540.

‡ *Treatise*, &c. edition 2. p. 164.

§ *Practical treatise*, p. 242.

Although these various considerations would lead us to expect that gonorrhœal discharge would not affect the eyes of the same individual, we meet in practice with cases, from which there is every reason to draw the contrary conclusion. It is a well known popular remedy for sore eyes to wash them with one's own urine; and persons labouring under gonorrhœa are sometimes so thoughtless as to resort to this practice. Experience teaches us that this direct application of infectious matter is capable of producing, not such a slight inflammation as BEER and SCARPA speak of, but acute gonorrhœal ophthalmia in its most destructive form. This is fully proved by CASE IV., of my treatise,[*] where both eyes were lost, and CASE XIV.,[†] in which the vision of one was destroyed. In CASE VIII.,[‡] in which partial sloughing of one cornea occurred, the patient had used to his eyes a towel soiled with gonorrhœal discharge from his own urethra. Mr. WARDROP communicated to me two cases, which occurred under his own observation. In one of them, that of a young gentleman labouring under gonorrhœa, who had inadvertently touched his eyes when his fingers were contaminated with the discharge, violent puriform ophthalmia occurred, and ended in the suppuration and collapse of both eye-balls. A soldier, who had gonorrhœa, was advised to bathe his eyes with his own urine, as a remedy for a slight affection of the lids: purulent ophthalmia seized one eye, which suppurated and burst. ASTRUC[§] saw a case in which both eyes became inflamed from this cause; but the affection does not seem to have been very severe. Another instance is detailed by Mr.

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[*] Page 69.
[†] Page 101.
[‡] Page 85.
[§] Vol. i. p. 295.

Foot;[*] the ophthalmia, which was of the most acute kind, ended in opacity of the cornea and loss of vision.

Experience clearly proves, what we should have expected *a priori*, that gonorrhœal ophthalmia may be produced by the application of gonorrhœal matter from another individual. This cannot be a very frequent occurrence for obvious reasons; and I have seen no instance of the kind. Mr. Wardrop has furnished me with two examples. An old lady went into the dressing-room of her son, who had gonorrhœa, and washed her face with a towel which he had been recently making use of. Purulent ophthalmia quickly supervened, and destroyed the eye in a few days. A washerwoman, who had been employed in cleansing foul linen, was seized in a few hours with puriform ophthalmia, which terminated in the suppuration and collapse of both eye-balls Delpech[†] mentions the instance of a young and healthy woman, who washed her eyes with goulard water and a sponge, which had been used by a young man affected with gonorrhœa. Violent ophthalmia came on, and quickly terminated in loss of the eye. Mr. Bacot[‡] distinctly traced the origin of the disease to infection, by means of matter from another individual, in three instances, two of which were washerwomen.

In a great proportion, however, of these gonorrhœal ophthalmiæ, we cannot trace the disease of the eye to the application of infectious matter, either from the same or another individual. The eyes are said to suffer by mestastasis; it is stated that the gonorrhœal discharge is suppressed, and that the inflammation of the eyes occurs in consequence of that suppression. Such is the representation of Richter,[§] Scarpa,[||] and Beer,[¶] who accordingly consider the restoration of the discharge from the urethra a principal indication in the treatment of the disease. In none of the cases, which have come under my own observation, has the urethral discharge been stopped; although it has generally been lessened, it has continued in some with little diminution.[**] On the other hand, the sudden stoppage of gonorrhœa, when effected by surgical treatment, is not followed by inflammation of the eyes. Since then gonorrhœal ophthalmia may occur, while the discharge from the urethra continues, and since it does not take place when that discharge is stopped, we cannot admit that the affection of the eye owes it origin to the cessation of disease in the urethra. I am inclined to refer its occurrence to the state of the constitution, without being able to point out in what that state consists; and to regard it as a pathological phenomenon analogous to those successive attacks of different parts which are observed in gout and rheumatism. The two other forms of ophthalmic inflammation, which take place in conjunction with gonorrhœa, show themselves only in rheumatic subjects, and generally in connexion with other arthritic sufferings; and the difference between one of these and the affection now under consideration is only in degree. This view of the subject may throw some light on the circumstance that, though direct infection operates equally on the eyes of both sexes, the gonorrhœal ophthalmia, said to originate in metastasis, seems to be confined to the male. I have never seen it in the female; and BEER, in the passage last quoted, says, that he has observed it only in young, robust, and plethoric men.

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[*] *Treatise on Lues Venerea*, 1820, p. 98.

[†] *Chirurgie Clinique*, t. 1, p. 318.

[‡] *Treatise on Syphilis*, p. 132.

[§] *Anfangs-gründe*, v. iii. § 57.

[||] *Treatise*, &c. p. 162—3.

[¶] *Lehre*, vol. 1. § 533. "In all the instances," says Beer, "which I have seen, this ophthalmia has occurred in young, plethoric, robust, and truly athletic men; and it has always taken place in a very short time, generally in a few hours, after the suppression of gonorrhœal discharge from the urethra."

[**] Delpech gives a nearly similar statement. "Il est bien reconnu que l'écoulement ne cesse pas toujours en pareil cas; que quelquefois, et même assez souvent, il subsiste dans toute sa force."—*Chirurgie Clinique* v. 1. p. 319.

The state of constitution, whether hereditary or acquired, which leads to gout and similar affections, is much less common in women than in men; and will hardly be found at all among those young and previously healthy females, who are the principal subjects of gonorrhœa. Again, the morbid influences, which are experienced and exerted by the male urethra, are different from those of the vagina.

Treatment.—The antiphlogistic plan, and particularly the general and local abstraction of blood, have been carried to their utmost extent; sometimes with complete, in other instances with only partial success. In many cases, the result must be unfavourable whatever plan is adopted, because, from the rapidity and violence of the disorder, irreparable mischief has been done before our assistance is required. Of six cases seen at an early period, and treated by extensive depletion, loss of the eye occurred in one only:* these persons were not seriously weakened by the measures adopted for them.

It has been represented that the complaint may be stopped in its outset by applying strong astringents or escharotics to the eye; such as a ten-grain solution or the ointment of lunar caustic; (see pages 123 and 212.) Destructive or injurious consequences have so frequently resulted under the usual management of the disease, that the local measures just mentioned ought to be adopted in any favourable case; that is, where the affection has not extended beyond the conjunctiva. Blood letting might precede or accompany the topical application. The propriety of this treatment is more questionable, if the cornea has begun to suffer; but the usual results of such cases are so unfavourable, that they could hardly be aggravated by the plan now proposed, which therefore deserves trial in a doubtful case.

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* *Treatise on the Venereal Diseases of the Eye*, p. 46.

I have seen mercury employed in these cases without any advantage.

I can place no reliance on the means advised by RICHTER, BEER, and SCARPA, for reproducing the urethral discharge, which has not been suppressed in the cases under my observation.

If the antiphlogistic treatment be preferred, it must be pursued according to the principles laid down under the head of purulent ophthalmia. Blood must be taken from the arm largely and repeatedly. For the slighter symptoms, which may remain after the inflammatory action has been subdued, local bleeding will suffice. The more vigorous depletion is recommended where the inflammation is fully developed, without the cornea being yet affected, or where the condition of the cornea may be doubtful; that is, where we may entertain the expectation of saving the organ from all injurious change.

If sloughing or suppuration should have already occurred, it will be of no use to pursue this very active treatment, although more moderate depletion may still be necessary. General sloughing, or general suppuration of the cornea, is usually attended by diminution of the inflammation, and cessation of pain, or at least comparative ease; the loss of blood therefore is no longer required for the relief of suffering: and it would be without an object, as vision is irreparably destroyed.

But inflammation may continue with undiminished violence after the occurrence of partial sloughing; and active depletion may still be necessary, both to limit the extent of the mischief, and to favour the processes of separation and restoration. In two cases,* very free depletion, both general and local, was employed after the cornea had suffered partially in this way;

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* *Treatise on the Venereal Diseases of the Eye*, pp. 85 and 90.

and the treatment was completely successful in preserving sight. In a third, where one cornea had sloughed entirely, and the other eye was actively inflamed, the venesection and local bleeding employed on account of the latter had no prejudicial effect on the former.

Experience does not warrant us in ascribing much efficacy to blisters: they are only to be regarded as an auxiliary measure, and may be resorted to after antiphlogistic means.

The ordinary local applications are only to be considered as means of lessening suffering, and thus contributing to the patient's comfort; not as having the power of checking this violent disorder. They possess in fact so little decided efficacy, that some patients find the warm most beneficial, others cold. The latter seem to me the best, at least in the early period of the affection; and I should be unwilling to employ the former for the reasons mentioned at page 208. The eye-lids and cheek must be frequently cleaned, particular care being taken to prevent accumulation of the discharge and incrustation on the edges of the former; for which purpose, it may be necessary sometimes to smear them with some mild unctuous substance.

Although we may succeed in checking the inflammation by the means just specified, its effects are not immediately removed; some time is required for the restoration of the membrane to its natural state. The swelling of the conjunctiva, and of the eye-lids, is lessened, the membrane becomes paler with a somewhat flabby appearance, and the purulent discharge is still abundant. The patient is probably pale and weak. It has been commonly considered necessary under these circumstances, to change the treatment altogether; to administer tonics internally, and to employ astringents locally. When the inflammatory symptoms have been quickly and completely subdued, the effects of the disturbance will pass off in a little time, as in other inflammations, without the use of astringents and tonics. It will be sufficient to lessen the restrictions in diet, and to use mild aperients.

An instance may be seen occasionally, but it will be very rarely, in which sloughing of the cornea is attended with a change of symptoms, such as a small and feeble pulse, with other evidences of general depression, requiring tonics and cordials. Such symptoms may occur in conjunction with an unfavourable state of the corneal ulceration, in which, although the swelling and redness of the conjunctiva are diminished, the ulcer spreads with a whitish or dull yellow colour, and an irregular surface and edge. Here the free use of bark and a more generous diet are necessary.

Astringent lotions are proper in the case just specified; and they may be safely employed whenever the inflammation has been completely subdued: although they may not accelerate, they will not under such circumstances materially retard recovery. Sometimes, however, they act as stimuli, and cause relapse of inflammation. Such relapse is the great source of apprehension after so violent a disturbance, and I think it will be most certainly averted by avoiding all local excitement, and pursuing mild antiphlogistic means.

The best forms of astringent applications are the solution of alum, from two to ten grains to the ounce of water, the solution of the nitrate of silver, and the undiluted liquor plumbi subacetatis.

Local means of this kind, especially the nitrate of silver, have been thought advisable in ulcers of the cornea, particularly those accompanied with protrusion of the iris; and, in the latter case, the remedy has been used in substance. I have found recovery to take place most speedily where none of these means have been employed.

SECTION II.—MILD GONORRHŒAL INFLAMMATION OF THE CONJUNCTIVA.

External redness of a bright scarlet tint, from distension of the superficial vessels of the globe, and increased mucous secretion, are the principal symptoms of this complaint. In slighter attacks the redness is not deep or general; the membrane is not swoln; there is little if any pain; and the increased secretion consists merely in a few streaks of whitish mucus lying between the eye-lids and globe, or adhering to the margins of the former. The characters of the affection, when more severe, approach to those of acute purulent ophthalmia. The conjunctiva swells, assumes a bright red throughout, and secretes a yellow mucus, which is discharged copiously from the eye. The complaint yields readily to antiphlogistic treatment, and is not attended with danger to the organ, if properly managed. In its more violent form, it requires active measures; and if not checked by their timely adoption, it may cause ulceration or opacity of the cornea, with serious injury of sight.

This mild gonorrhœal inflammation of the conjunctiva may be safely and advantageously treated on the astringent plan, particularly by the solution of lunar caustic, the use of which may be preceded by antiphlogistic means in patients of full habit, or where we fear that the organ is in danger from probable extension of inflammation to the cornea.

SECTION III.—GONORRHŒAL INFLAMMATION OF THE EXTERNAL TUNICS AND IRIS.

The vascular trunks lying between the conjunctiva and sclerotica are distended, and the anterior portion of the latter membrane becomes of a pink or purplish red. As the conjunctiva participates but slightly in the affection, these changes are distinctly seen through it. There is increased lacrymal secretion, severe pain in the eye with sense of tension, intolerance of light with profuse discharge of tears on the slightest exposure. The pain and intolerance are sometimes excessive, so that the smallest access of light cannot be borne.

The inflammation soon extends to the iris, which loses its brilliancy, assuming a dull and deeper hue. The pupil contracts, and lymph is effused from its margin. The external redness is increased, the vessels of the conjunctiva being more distended. The cornea at the same time becomes hazy, and vision is more or less impaired. Nebulous opacity and speck of the cornea are sometimes produced. As the inflammation subsides, the iris recovers its natural colour, and vision is restored.

If the inflammation be considerable, it may cause adhesions of the pupil, with contraction of the aperture; and the adhesions thus formed are sometimes white as in arthritic iritis. Even permanent dimness of sight may be produced. Sometimes repeated attacks of the disease occur, each of which causes fresh adhesion, so that at last the pupils are fixed in their whole circumference and considerably contracted.

This affection must be treated by the abstraction of blood, general or local, and by other corresponding measures. If the inflammation be considerable, if it should occupy both eyes, and the patient should be young, robust, and plethoric, free general bleeding will be required. Cupping and leeches will suffice in the milder instances. Warm local applications are generally the most agreeable to the patient's feelings: the poppy fomentation answers the purpose very well. Exclusion of light is absolutely necessary so long as the intolerance continues. When the inflammation is checked by these measures, blisters may be advantageously applied, and the cure may be completed by the administration of Plummer's pill once or twice a day, with mild aperients and a regulated diet. Colchicum is often used with advantage on account of the rheumatic symptoms which accompany this affection; and the eye may be expected to participate in the benefit, although the remedy cannot be depended on as a means of counteracting dangerous inflammation of the organ. The same observation is applicable to residence at the sea-side and warm bathing, which are more advantageous to the lingering arthritic ailments, under which patients frequently suffer so long in these cases, than to the ophthalmic affection.

It is not uncommon for the same individual to experience at different times, in consequence of or in connexion with gonorrhœa, both this inflammation of the external tunics and iris, and mild inflammation of the conjunctiva. Some cases recorded in my *Treatise on the Venereal Diseases of the Eye*,* exemplify this circumstance, which was also observed in two of the cases related by Mr. Brodie.†

Rheumatic inflammation of the joints accompanies both these forms of ophthalmic disease, when they take place in consequence either of gonorrhœa or of other discharge from the urethra. All the cases of these affections related in my treatise, except one, exemplify this combination. Mr. Brodie has mentioned five cases of this description, in all of which the disease of the eyes was that which I have called mild gonorrhœal inflammation of the conjunctiva; while in two of them, although the conjunctiva had been affected on one occasion, the sclerotica and iris suffered on another.‡ Inflammation of the joints occurred in all.

Dr. Vetch § relates the case of an officer, who had contracted gonorrhœa, of which the symptoms were well marked and violent, having been attended in the first instance with hernia humoralis. Rheumatic inflammation of the joints and inflammation of the external proper tunics of the eye followed on each occasion. After the second attack, Dr. Vetch found an "irregular and contracted pupil, with some opacity of the capsule of the lens, and adhesion between it and the iris; and on causing him to shut the sound eye, the vision of the left eye was found very much impaired."

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* Cases xvi., xix., and xxi.

† *Pathological and Surgical Observations on Diseases of the Joints*, p. 55 and 60.

‡ Ibid, p. 55—63.

Practical Treatise, &c. p. 161.

Inflammation sometimes exists at the same time in the urethra, the eyes, and the joints: in other instances these parts are affected successively.

The affection of the eye last described is exactly the same as rheumatic inflammation of the sclerotica and iris occurring independently of gonorrhœa. Both this and the mild purulent inflammation of the conjunctiva are to be regarded as rheumatic affections of the organ excited by gonorrhœa; that is, they take place in individuals, in whom this constitutional disposition is shown by inflammation affecting either the synovial membranes or the fibrous structures of several joints. Although the organs seem at first view very dissimilar, there is an analogy of structure between the parts which suffer in the two instances; that is, between the synovial membranes and the conjunctiva, and between the ligaments and fibrous sheaths, and the sclerotica. Hence we need not be surprised at finding that the eyes suffer under the influence of that unsound state of constitution, which leads to these affections of the joints. The structure originally affected, the lining of the urethra, is also a mucous membrane, which sometimes becomes inflamed, and pours out a puriform discharge, in gouty and rheumatic subjects, from internal causes. That the essential cause of this combination of morbid phenomena is peculiarity of constitution, may be inferred from the repetition of attacks, and the length of time for which some individuals are harrassed by successive appearances of disease in various parts. In one patient rather severe purulent ophthalmia occurred in August, 1822, and a similar one followed soon after; from that time to the present, six attacks of rheumatic iritis have taken place. In another, discharge from the urethra without infection occurred four times; then inflammation of the foot; three years after, severe inflammation of the chambers of the aqueus humor; then gonorrhœa and mild purulent inflammation of the conjunctiva, followed by rheumatic inflammation of various joints; and afterwards severe rheumatic inflammation of the sclerotica and iris. In a third, violent gonorrhœa was followed by acute inflammation of the external tunics; a second gonorrhœa excited, first purulent ophthalmia, then acute inflammation of the external tunics, and subsequently rheumatic inflammation of various joints. Two years after, severe rheumatism was brought on by cold. I lately saw a gentleman with gonorrhœa, mild purulent inflammation of the eye, and rheumatic affection of the foot and back: it was the fourth attack he had experienced of the same combination of symptoms. One patient seen by Mr. Brodie had undergone four attacks, all of which began with gonorrhœa; it was followed, first by purulent ophthalmia, and then by inflammation of the synovial membranes of several joints.[*] In another there had been eight attacks at various intervals during a period of seventeen years.[†]

As the train of diseases just described must be referred principally to peculiarity of constitution, gonorrhœal infection is not essential to their production; it is only to be regarded as one of the exciting causes, and perhaps the most frequent. There could be no doubt that gonorrhœa had been contracted in several cases of which I investigated the history. In another instance the patient was convinced that he had not received infection; and, according to his description, the usual characteristics of gonorrhœa virulenta had been wanting. Mr. Brodie seems to have considered that the discharge from the urethra, in some of the instances which he had seen, was not caused by infection. In the case of the gentleman, who had had eight attacks, inflammation of the urethra with discharge was the first symptom, and occurred before the age of twenty; he believed, however, that he had not been exposed to the risk of infection. In three of the attacks, purulent ophthalmia was the first symptom, being followed by discharge from the urethra and inflammation of the synovial membranes. In the other four attacks, inflammation of those membranes occurred without any previous disease of the eye or urethra.[†] In another case discharge from the urethra brought on by use of a bougie was the first symptom.[‡]

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[*] *Pathological and Surgical Observations*, &c. p. 63. [†] P. 60. [‡] P. 63.

CHAPTER XI.

RHEUMATIC OPHTHALMIA: CATARRHO-RHEUMATIC, ERYSIPELATOUS, AND PUSTULAR OPHTHALMIA.

RHEUMATIC OPHTHALMIA.

ALTHOUGH many points in the pathology of gout and rheumatism are obscure, we know that these diseases particularly affect the fibrous structures, such as enter into the composition of joints, and are found in their neighbourhood, and the synovial membranes. When any morbid affection is the result of a particular constitutional disposition, there is a tendency in all the structures of the same kind to be affected under certain circumstances; accordingly those textures of the eye, which resemble the fibrous, as the sclerotic and cornea with the closely connected iris, and the mucous membrane of the eye which is analogous to the synovial membrane of the joints frequently suffer under the same state of constitution, which gives rise to rheumatic inflammation of similar structures in other parts of the body. The urethra often participates in the affection, and a discharge, like that of gonorrhœa, takes place from the canal. These remarks are exemplified in the affections last described, of which the two latter might with as much propriety be called *rheumatic* as *gonorrhœal* inflammations: for they are seen to occur in instances, where the patients are not aware of having contracted infection; and, when they result from gonorrhœa, that is only to be regarded as their occasional or exciting cause.

The name of *rheumatic ophthalmia*[*] is, however, applied more particularly to an inflammation of the sclerotica, caused by exposure to cold, and presenting the general characters already described in the account of external ophthalmia; (see page 80.) The local symptoms are not of a violent kind, as the disorder is chiefly confined to the sclerotica. It is usually accompanied with haziness and dulness of the cornea, and corresponding indistinctness of vision; but it does not often lead to any serious change in that part. It may slowly creep on to the iris. The conjunctiva is not affected, or only slightly; and the same remark may be applied to the eye-lids. There is a dull aching pain, with sense of tightness; and often more serious pain around the eye, as in the brow, temple, cheek, nose, and in the head, than in the eye itself. This pain becomes worse at night. Exposure to light is not found very troublesome: this, however, as well as the watering of the eye, depends on the degree of the inflammation. There is more or less constitutional disturbance of a febrile character.

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[*] *Sclerotitis Rheumatica vel Atmospherica.*—MACKENZIE.

The treatment must be regulated according to the degree of the inflammation, the great object being to lessen that, and guard against its effects. Venesection is necessary in the outset, in most instances; especially if the patient be plethoric, the pulse full and hard, and the tongue white. Cupping from the temple, and leeches may follow, or be sufficient alone. Warm applications are found most comfortable. The bowels should be opened by calomel and James's powder combined with extract of colocynth, and followed by an aperient draught. Diaphoretics and warm pediluvia may be serviceable.

Calomel and opium in a nightly dose, or in a smaller quantity two or three times in the day, after the more active antiphlogistic treatment, relieve the pain, and soon remove the other symptoms. Mercury is more especially necessary, when extension of disease to the iris is apprehended. Affection of the mouth is rather advantageous than otherwise.

Colchicum has been employed in these rheumatic cases, either as an adjunct to purgatives, in the dose of ʒi or ʒiß of the wine; or in the former dose repeated every four or six hours until some decisive operation is observed. The effects of this powerful remedy must be closely watched, if it is administered in that manner.

There is another form of rheumatic ophthalmia, in which the affection is confined to the sclerotica; the conjunctiva, cornea, and iris not being at all involved. The following was a well-marked example. I was sent for to a gentleman, who laboured under severe rheumatic affection of one foot and knee, and one hand, with pains in the back, and great constitutional excitement; the parts were swollen, slightly red, and very painful: it was one of the cases commonly called rheumatic gout. Active antiphlogistic treatment, followed by colchicum and other means, removed the rheumatic affection, and the patient considered himself well. After a short interval, I called to inquire about his health, when he said that something was the matter with his eyes, and wished me to examine them. I looked at them hastily; the room was dark, and the day dull; and I saw no appearance of disease. When I called again, after a few days, as the complaint was repeated, I examined more attentively. On bringing him towards the window, he obviously felt the light troublesome; he drew down the eye-brows, and half closed the lids to avoid it. The conjunctiva was natural, but the whole of the sclerotica had a livid red and mottled appearance, which might have been called dull, or almost dirty, in comparison with the red colour of common active inflammation. The sclerotic vessels were partially distended; the redness terminated short of the cornea, so that there was a distinct white rim round the latter, as if it had been drawn with a compass. Vision was perfect: there was no pain, so long as the eye remained at rest, but exertion of the organ, particularly under strong light, brought on uneasiness. The nature of this gentleman's occupations, and of his tastes, which were literary, prevented him from giving his eye the necessary rest; and the above described condition of the sclerotica lasted for three or four months, making me apprehensive that some serious mischief to the organ would ensue. The affection, however, was confined to its original seat, merely exhibiting the obstinate nature which belongs to disorders of such structures; and it at last disappeared completely, leaving the eyes with their organization and powers unimpaired. Cupping, leeches, and blistering were employed, with regulated diet, and occasional aperients. Plummer's pill was taken daily, or twice a day, for about three months. Bark was tried without any advantage.

I have lately seen a case, which has lasted nearly a year, the disease having been confined to the sclerotica, with greater redness than in the preceding instance, but without any change in the cornea, or diminution of vision. Sometimes the symptoms have nearly disappeared, and then come on again unexpectedly. Quinine, colchicum, and sarsaparilla have been fairly tried with doubtful benefit. More advantage has resulted from cupping on the temple, the tartar emetic ointment on the nape, Plummer's pill with aperients, and the exchange of country air, with free exposure to it in exercise, for a more sedentary life in the atmosphere of London.

Foreign writers, particularly the Germans, lay great stress on that peculiar state of constitution, which gives rise to these affections, and prefer the employment of such measures as they consider calculated to remove that state, to the use of means strictly antiphlogistic. They enumerate a variety of remedies, which they suppose to be *antiarthritic*, such as decoctions of bark, and other tonics, guaiacum, antimony, Dover's powder, &c. In the first place, it is very doubtful whether these remedies are specifically antiarthritic; and we know from experience that it is very difficult to remove such a condition of the system. In the second place, the exclusive reliance on such measures appears to me to compromise the safety of the organ, when it is labouring under active inflammation. Perhaps the mild antiphlogistic treatment which the eye may require, is the most effectual to remove that state of the system called arthritic, or rheumatic; since in many such cases there is either general plethora, or local inflammation. One remedy, however, recently introduced into practice, (the colchicum,) possesses decided antiarthritic influence: hence, as well as from its well-known general antiphlogistic power, it may become a useful auxiliary in rheumatic affections of the eye, whether of the more acute or chronic form. I have seen its rather free employment of decided advantage in the former.

The vinum opii, which has been recommended in rheumatic ophthalmia, both acute and chronic, in the former, after the more active inflammation has been removed, may be tried with safety.

In *catarrho-rheumatic* ophthalmia we see nothing more than active external inflammation, embracing the mucous and fibrous coats of the eye, and requiring an antiphlogistic treatment, corresponding to the degree of inflammatory disturbance. The account of external ophthalmia, in CHAPTER III., may be considered as a description of this affection, and of the consequences it is capable of producing; while it must be treated, both in the acute and chronic stages, in the manner detailed in CHAPTER V.

Erysipelatous ophthalmia.—The external inflammations of the eye exemplify the great variety in local and general symptoms, which diversities of organization, habits, age, sex, and all other contingent circumstances, are capable of producing in the phenomena of disease; and they illustrate not less strongly the essential similarity of these apparently different processes, and of the means necessary for their treatment. Under the denomination of *erysipelatous ophthalmia*, the Germans have described a modification of conjunctival inflammation, which is occasionally seen, but which is neither sufficiently peculiar nor important to require any long consideration. The vascular congestion in the conjunctiva is not considerable, nor does the patient usually experience much inconvenience. There is watery effusion into the subjacent cellular tissue, making the membrane appear œdematous; this fluid gravitates towards the lower part of the globe, so that the conjunctiva projects a little at the edge of the lid, with a watery, or jelly-like appearance. The eye has altogether a watery look, which might justify the term *ophthalmia serosa* or *humida*. Sometimes the sclerotica participates, and there is greater redness, with more or less pain, and sensibility to light. In these severe cases, the palpebræ and surrounding parts exhibit some erysipelatous redness and swelling; there is pain in the head, with furred tongue, nausea, and general feverishness. The affection is seen in persons of, or after, middle age, and generally of an unhealthy constitution. An emetic, followed by an active purge, will remove the complaint in its slighter forms. When the excitement is more considerable, cupping and blistering may be required. Warm fomentations are the best local means.

Pustular ophthalmia is an inflammation of the mucous membrane, constituting an intermediate link between catarrhal and strumous inflammation. The small elevations called pustules are occasionally seen in catarrhal inflammation of the membrane, and they occur frequently in strumous ophthalmia, but we designate by the epithet *pustular* an inflammation seated in the conjunctiva and confined to it, occurring in young subjects, and attended with the formation of pustules, but not exhibiting the other symptoms of catarrhal or strumous inflammation. Like strumous ophthalmia, it is an affection of young persons; we rarely see it after puberty. We observe a distended fasciculus of vessels upon the conjunctiva, running towards the cornea and terminating just at its margin in a small reddish or whitish elevation, called a *pustule*: sometimes the vessels extend over the boundary, and advance for a short distance on the cornea, the pustule then being formed on the latter part. The pustules contain at first a kind of watery fluid, and therefore they have been called *phlyctenæ*, or *phlyctenulæ*. Sometimes we find only one, sometimes more, in different parts of the conjunctiva, and sometimes there is a great number of them, extending completely round the margin of the cornea. They vary in size, being sometimes small, at other times large; when only one pustule forms, it may be as large as the half of a pea, but in proportion to the number are they smaller. In this affection there is scarcely any pain and no intolerance of light, and were it not for the appearance of the pustule and the redness, the patient would hardly think there was any thing the matter with the eye. Under a proper treatment it does not extend to the sclerotic coat; but if neglected, and especially if there be any scrofulous disposition, it may be more serious. If the complaint continues, and the inflammation proceeds, the pustules, whether situated over the sclerotica or on the cornea, ulcerate; the ulcer being rather disposed to spread. Under proper treatment they disperse without ulcerating. Mild aperients and saturnine lotion are generally sufficient. More acute cases may require leeches and blisters.

CHAPTER XII.

SCROFULOUS OR STRUMOUS OPHTHALMIA.

This is an external inflammation of the eye, exhibiting modifications in its symptoms, progress, and consequences, derivable from peculiarities of constitution in the individuals whom it affects, and requiring corresponding modifications of treatment. We may therefore say that scrofulous ophthalmia is inflammation of the eye occurring in scrofulous subjects.

Scrofulous constitution.—All mankind are not formed after one pattern; if it had been so, the business of the physician and surgeon would have been much more simple than it is. There are diversities of natural organization, and analogous varieties in the forms of disease. Each individual has something peculiar in constitution, as well as in form and features. But the peculiarities, with which it is more important that we should become acquainted medically, are those which distinguish classes more or less numerous: and of these none is more common than the scrofulous. The word *scrofula* is used in two senses; either to designate that assemblage of characters, which mark a particular disease; — to denote the peculiarity of constitution, generally original or connate, from which such distinctive characters are derived. In the former sense, *scrofula* is equivalent to *scrofulous disease;* in the latter, to *scrofulous constitution.* We can point out certain external marks of scrofula; but we have not yet discovered the differences in the elementary composition of the frame, on which the characteristic peculiarities of scrofulous disease depend. The morbid disposition, however, is strongly marked: certain forms of disease are so easily excited, and return so readily, that it is almost impossible to keep them off. The absorbent glands, and other organs of glandular structure, the mucous membranes and skin, the lungs, bones, and joints, are the parts most liable to scrofula. Of the membranes, such as are exposed to the external air suffer most; for instance, those of the eyes, nose, and lungs.

Two kinds of constitution, differing considerably in some respects, are observed in persons called scrofulous. In one there is a pale and bloated countenance, a swelling of the upper lip and septum of the nose, and a tumid abdomen. The mucous membrane of the stomach and bowels is easily disordered by errors of diet, or by trifling causes, which would have little or no effect on other persons. When these important organs are disturbed, the nutrition of the entire body is more or less impaired. There is a languid state of circulation, so that the skin is pale and rough, and the extremities are cold; the muscular flesh is loose and flabby; and there is a kind of torpor in all the functions, bodily and mental. In the other set of subjects the integuments are thin, and the ramifications of the cutaneous veins are distinctly seen; there is an almost unnatural colour in the cheeks. The circulation is rapid, the nervous system irritable, and both are easily excited. The various functions of body and mind are performed quickly. A premature development of intellect is often observed in such children, and they are affected powerfully by all external influences. We cannot suppose that the phenomena and treatment of disease will be the same in the two kinds of constitution just described, though the term scrofulous is used in both instances.

Exciting causes of scrofula.—Of these, cold is the most powerful, especially when combined with moisture. Hence scrofulous disease is most prevalent in countries with a moist and damp atmosphere, such as Great Britain, the north of Germany, and of France; but it is found elsewhere, and that in extensive prevalence. BEER states, that nine-tenths of the ophthalmic inflammations in children at Vienna are strumous.* **Benedict** considers that in Breslau the proportion is greater; he says 95/100.† The late **Dr. Gregory**, of Edinburgh, used to say that there was not a single family in Scotland free from scrofula. **Dr. John Thomson** even represents that "it is rare to meet with an individual who has not, at some period of life, experienced disease in some shape or other belonging to one of the several forms of scrofula." ‡

The next in order of the direct causes is insufficient or unwholesome food, excess, or irregularity of diet. Its effect is aggravated by sedentary habits, neglect of exercise, and residence in bad air. Parents are often over anxious that children should begin their studies, that they should employ themselves in acquiring learning and accomplishments. Thus young persons are compelled to devote to sedentary pursuits many hours which they would otherwise occupy, and probably with greater advantage to mind as well as body, in active exercises.

These direct causes, when combined, and acting powerfully, as among the poor inhabitants of large towns, are capable of producing in those originally healthy a state of constitution hardly distinguishable from the scrofulous. This acquired morbid disposition is marked by disordered digestive organs, pallid and unhealthy skin, cold extremities, and flaccidity of muscle; that is, by the same characters which belong to congenital scrofula.

The liability to scrofula does not extend equally through the whole of life. Disease of this character generally, and strumous ophthalmia in particular, are not seen in infants at the breast, which, being kept warm, and having a supply of wholesome food prepared by nature, escape the two great exciting causes. They prevail, however, extensively from the end of suckling to the age of puberty, in which period the processes of nutrition and growth are going on actively, and easily disturbed by the circumstances already alluded to. Strumous ophthalmia is seldom seen after puberty; but other forms of ophthalmic inflammation are often found more obstinate in persons of scrofulous constitution.

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* *Lehre*, vol. i. p. 588, note. He adds, that there are few families in Vienna, in which some of the children do not exhibit the scrofulous diathesis.

† "Of one hundred cases of ophthalmia in children, ninety-five or more are scrofulous."—*Handbuch*, vol. ii. p. 165. He assigns as reasons for this great prevalence of scrofula, the marshyness of the ground on which Breslau stands, the narrowness and filthiness of the streets, and the use by the poorer families of unwholesome food, such as dumplings, potatoes, black bread, and bad beer.

‡ *Lectures on Inflammation*, p. 163.

Strumous individuals are liable to inflammations of the lids, which take on the form of induration and thickening, or of hordeolum. The lacrymal sac and nasal duct also frequently suffer in such habits. These subjects I shall not advert to at present, meaning to describe an external inflammation of the eye, originally seated in the conjunctiva, often affecting the sclerotic coat and cornea, seldom going deeper, but occasionally extending even to the iris.

Symptoms and course.—The external redness, which is often inconsiderable, and sometimes more apparent in the lining of the lids than in the eye, is partial in the latter situation. Particular vessels, or fasciculi of vessels, are distended on the surface of the membrane, run towards the cornea, and extend over its margin, or stop short at the boundary between it and the sclerotica. Where these fasciculi terminate, we observe the small elevations, called pustules or phlyctenæ. These, which may have a whitish appearance, or contain a little clear or yellowish fluid, may be single, or in greater number, situated on the cornea or sclerotica, or (which is most frequent) on the boundary between them. The occurrence of these elevations, which is characteristic, though not belonging exclusively to the present affection, has led MR. MACKENZIE to regard strumous ophthalmia as "an eruptive disease, affecting the conjunctiva, not as a mucous membrane, but as a continuation of the skin over the eye."*

The access of light to the eye is painful, and the uneasiness produced by this cause is carried to an extreme degree, so as to constitute a distinguishing symptom of the complaint. The lids are spasmodically closed, and a powerful contraction of the orbicularis palpebrarum offers an effectual obstacle to any attempt at opening them. If they are forced open, the cornea is turned up under the edge of the orbit, away from the light. The spasmodic action of the orbicularis, excited by exposure to light, causes actual pressure on the eye, and makes the child scream with pain. This action of the muscle makes the lids look as if they were swollen, but they are not so. The child makes every effort to protect the organ from the painful impression of light, contracts the brows, draws down the skin of the forehead, elevates the lips and alæ of the nose, and in short puts into action all the muscles of the face to protect the suffering organ. Hence arises a peculiar and characteristic physiognomy of the disease, so that we can easily determine its nature on the first sight of the patient. The painful impression of light upon the organ in severe cases, is such that the child seeks the very darkest corner of the room, to escape from the light, and, if in bed, it will turn the face against the pillow, or hide it under the clothes, to accomplish the same purpose. For the same reason, if brought into the light it presses the hand against the eyes and holds the head down; great irritation, redness, and eruption being often produced upon the forehead and nose by this cause. This position of the head produces determination of blood to the affected parts, aggravating the disease in the eye. The great sensibility of the retina (*photophobia scrofulosa*) is not the result of inflammation, nor is it in a direct proportion to the increased redness, being often excessive where the eye appears almost natural; indeed redness is not essential to the disease. It is a sympathetic or functional affection. In such cases as I am now describing there is no immediate disorder of the retina; the child will be able to open its eyes, and to see as well as if there was nothing the matter with them, towards dusk. It is a disordered sensibility of the retina, dependent on the state of the alimentary canal. This symptom need not excite any fear of injury to vision. If the inflammatory symptoms are active, with much external redness, there may be considerable pain; but under other circumstances the patients do not suffer much so long as light is excluded.

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* *Practical Treatise*, p. 382.

There is a copious flow of tears when the affection begins; the external surface of the organ suffers great irritation, the lacrymal gland sympathises with that irritation, so that when we attempt to examine the eye, a quantity of clear hot fluid runs out from between the lids. When the eye is exposed to light, a copious discharge of hot scalding tears takes place; the passage of these into the nose excites sneezing, often for several times in succession. These irritating tears produce redness of the lids, and excoriate the palpebræ and face. They cause itching and soreness in the parts over which they flow, and aggravate the original complaint; the child rubs and scratches the lids and face, which become red, sore, and pimply. Small yellow pustules form on this inflamed skin, and produce a discharge which incrusts. The affection extends on the forehead, temples, and face, the pustules and incrustations increasing; in its worst form it is called *crusta* *lactea*, or *porrigo larvalis*, from its coating the face like a mask. An eruption of this kind, commencing in the lids and spreading over the face and head, will sometimes extend over the body.

The affection of the eyes is accompanied by disorder of the stomach and bowels. There is costiveness, with white or furred tongue; often fetid breath, distended abdomen, morbid appetite, grinding of the teeth during sleep. The head is hot in the beginning; sometimes there is also heat of skin, especially at night, with restlessness; but, in the progress of the complaint, the surface becomes pallid, and feels dry and harsh.

The edges of the lids are often red, swollen, and painful. The mucous membrane of the nose is frequently affected; there is an acrid secretion with excoriation of the nostrils, with swelling and redness of the alæ nasi, and often of the upper lip. The ears are red and sore, and excoriated behind; and the absorbent glands of the neck are frequently swelled.

The symptoms are worse during the day; there is a remission when the sun has descended below the horizon. Children, who have hid themselves in the dark all day, recover their activity at night and open their eyes without pain. Generally both eyes are affected, though not in an equal degree. The disease may begin in one, and pass to the other; or they may suffer alternately.

The inflammation of the eye may suddenly get better, and will return as suddenly. There are often repeated attacks at longer or shorter intervals, and slight exciting causes will renew disorder where the disposition is strong. In this way the affection lasts for months and years, and it is difficult to say when the patient is permanently recovered. The affection of the eye often alternates with other symptoms; the ears become worse, and the eyes get better, or *vice versâ*.

Effects.—Scrofulous inflammation of the eye often produces serious consequences, particularly on the cornea, and it may do so, although external redness may not exist in a great degree. We are accustomed to measure the degree of inflammation and to judge of its probable consequences, in other forms of external ophthalmia, by the extent of redness; but in strumous inflammation, the progress of the complaint is insidious, and we may have changes of structure produced in the cornea, when the visible symptoms are not alarming. The elevations of the conjunctiva previously mentioned under the names of pustule and phlyctena may subside, leaving a thin opacity, which gradually disappears. Sometimes there is a considerable thickening and elevation of the corneal conjunctiva of a white colour, with a fasciculus of red vessels passing to it: this leaves an opacity, which becomes diminished, but does not disappear. The pustules and phlyctenæ more commonly ulcerate. The ulcers, which are irregular in figure, and have a rather ragged edge, may either extend superficially, or make their way through the cornea into the anterior chamber, being attended in the latter case by prolapsus iridis.

The vessels, which pass from the conjunctiva over the cornea, instead of forming pustules, may extend laterally, and unite, by their ramifications, the texture of the corneal conjunctiva becoming at the same time thickened, and more or less opaque. These changes may go to the extent of making the whole corneal covering thick and vascular *(pannus.)*

There is often general dulness of the cornea from interstitial deposition; this may be accompanied by enlargement of the proper corneal vessels, giving to the part a red colour. This discolouration is sometimes of a dull brownish red tint, and apparently caused by interstitial effusion of blood.*

In such a great and serious affection of the cornea, there will occasionally be produced adhesion of the iris to it; and as the texture of the cornea is weakened, it may yield to the pressure from within, and be enlarged into the external protuberance called *staphyloma*.

These are the changes effected in the external parts of the eye by strumous inflammation; and the alterations of structure are generally limited to the exterior of the organ. Occasionally the effects of strumous inflammation extend to the sclerotic coat and iris, and even to the parts seated behind them. We have seldom an opportunity of observing the first stage of this iritis, on account of the changes going on in the cornea. When scrofulous ophthalmia has existed a long time, or when the patient has had repeated and severe attacks, the sclerotica and the more deeply seated parts may be so much changed in structure, that the form of the eye may be altered; the external coat may yield to the pressure of the contained parts. A greater secretion of the humours taking place, the eye-ball gradually enlarges, and hydrophthalmia is produced. The sclerotica may give way partially to the pressure from within, when staphyloma scleroticæ takes place. Sometimes there is a general bulging of the sclerotica round the cornea, apparently from morbid enlargement of the corpus ciliare.*

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* See the work of Dr. R. Froriep next quoted, fig. 1 and 2.

Diagnosis.—Strumous ophthalmia is distinguished by the characters I have mentioned; by the intolerance of light combined with trifling external redness and copious lacrymal secretion, and by the pustular elevations of the conjunctiva. These symptoms frequently co-existing with strumous inflammation in the lips, the nostrils, behind the ears, and in glandular structures in other parts of the body, form altogether so well marked an affection, that it can hardly be confounded with others.

Prognosis.—The prognosis is favourable so long as the cornea remains clear. It is still favourable if the cornea should be opaque, provided the opacity be only superficial, or if it appear to be owing to deposition between the laminæ of the cornea; for we generally succeed in removing it by suitable treatment. Ulceration leaves behind a permanent opacity, which seriously injures vision when it is opposite the pupil. Should it be attended with prolapsus iridis, the consequences are worse, but much depends on the position and extent of the protrusion. Vascularity of the cornea, even when considerable, will disappear when the inflammation is removed; but restoration of the natural smoothness and transparency can hardly be expected, if the change of structure should have attained the extent of pannus. If ulcers should have extended deeply, if the cornea should have become generally opaque, and if there should be also affection of the iris, or change of structure in the sclerotica, the prospect is most unfavourable.

In describing diseases, we find it necessary to select the instances in which the characters of the disease are best marked. We do not find them exactly as they are described in books and lectures; and they, who are only acquainted with them from such sources, discover, when they have to examine the sick, that several morbid affections are not so clearly characterised as they expected. We give names to such forms of disease as are clearly marked; but we see many cases which do not come under our descriptions. There is an insensible gradation from one form to another, so that we cannot draw an accurate boundary line between them. This is the case with strumous and common ophthalmia. If we find the nosologies imperfect, we must recollect that they are not the productions of nature, but the work of man.

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* This is called by Dr. R. Froriep, *staphyloma corporis ciliaris. Diss. Med. de Corneitide scrofulosa*, Jena, 1830, 4to. fig. 8. In the same work, the author has described and delineated the various changes which scrofulous inflammation may cause in the cornea and in the more deeply seated textures of the eye. The figures are also published in the *Chirurgische Kupfertafeln*, part 53.

A troublesome inflammation occurs in the eyes of children, which is referable to the state of the skin, stomach, and bowels, but does not present all the characters of the strumous affection just described. There is more external redness; not so much intolerance of light; nor so many marks of strumous disposition in the system. In some instances of delicate strumous children, we have intolerance of light without any other symptom, and we find that this has sometimes received a distinct name, having been called *photophobia scrofulosa*, or the scrofulous intolerance of light. Between this simple intolerance on one hand, and acute external inflammation with general and vivid redness on the other, there is every possible intermediate shade. In infants, who are the subjects of *crusta lactea*, the eye suffers sometimes from the extension of the cutaneous affection. These various disorders may be considered, in point of pathology and treatment, as coming under the head of strumous ophthalmia.

Causes.—Exposure to cold and wet favours the occurrence of strumous affections generally, and not less so that of scrofulous ophthalmia. Hence children suffer much, especially when insufficiently clothed, from cold winds, and from sudden changes in the weather. The disposition to strumous inflammation will be called into action by any circumstances which weaken the constitution; it occurs frequently after measles, small-pox,[*] hooping cough, scarlet fever,[†] in short, after the operation of any causes which may have weakened the system.

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[*] Juengken represents vaccination as one of the most frequent causes of scrofulous ophthalmia. He considers that a certain degree of energy is required, in order to remove from the system the poison introduced by the inoculation :—"If the child is too weak or too young, some of the morbific matter remains behind, and calls into action the scrofulous diathesis. Hence the practice of vaccinating children as early as possible cannot be approved ; for the greater number of those who are vaccinated in the first year, become affected afterwards with scrofulous ophthalmia."—*Lehre von den Augen-Krankheiten* ; p. 218.

[†] The disease described by Mr. Wardrop, in his "Account of the Exanthematous Ophthalmia, with Observations on its Treatment," contained in the *Transactions of the Medico-chirurgical Society of Edinburgh*, vol. ii., and that to which Mr. Christian has given the name of *porriginous ophthalmia*, in his "Observations on a particular species of Ophthalmia, occurring in connexion with

Treatment.—We must endeavour, in the first instance, to remove that unhealthy condition of the digestive organs and skin, which is so prominent a feature in the complaint, and consequently to invigorate the constitution. Unless these objects can be accomplished, means applied to the eye will be of little service. Hence the general treatment is more important than the local. In the first place, the state of the alimentary canal must be attended to. The use of purgatives is generally necessary; and those of an active kind are often required, even in young children. We should begin by giving a dose of calomel with jalap or rhubarb, or calomel followed by the senna draught, or by castor-oil; and it may be necessary to repeat these purgatives two or three times, so that the canal may be completely cleared from the accumulated load of ill-digested food and unhealthy secretions. The administration of two or three such doses often produces the greatest relief to the sufferings of the child. When this has been accomplished, a mild course of alterative and aperient medicines will be useful; such as calomel and rhubarb in small doses, every second or third day, calomel with antimony, or the hydrarg. c. creta with some gentle aperient. Rhubarb and the compound decoction of aloes are the medicines best suited for this purpose; and these, or some other aperients, must be employed at any time when the natural action of the bowels is deficient.

In the state of debility to which the little sufferers are frequently reduced by this painful and obstinate complaint, tonic medicines may be employed very advantageously after the alimentary canal is cleared; of these bark is the best, and the sulphate of quinine the most efficacious form. Mr. MACKENZIE[*] has commended this remedy very strongly, and I agree with him to the full extent of his statement. "After a trial of numerous and various internal remedies in this disease, I have found none so useful as the sulphate of quina. It exercises a remarkable power over the constitutional disorder which attends this ophthalmia, and thereby over the local complaint. The dose which I employ is generally a grain thrice a day, rubbed up with a little sugar; in very young children half a

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Porrigo, and usually termed Scrofulous Ophthalmia," contained in the *Glasgow Medical Journal*, vol. i., do not seem to me to differ in any essential respect from strumous ophthalmia, nor to require separate notice. I will only observe, that Mr. CHRISTIAN ascribes the occurrence of the ophthalmic affection in the cases to which he alludes, to infection of the eye by the discharge of the porriginous pustules conveyed by the fingers of the patient.

[*] *Practical Treatise*, p. 393, 394.

grain; and in adolescents or adults two grains." He adds, that its powers in all other forms "are insignificant in comparison to those of the sulphate of quina. In most instances, its effects are very remarkable; and, indeed, (although I have met with a few cases, which have appeared to resist its beneficial influence,) in most of the little patients, to whom I have administered it, it has acted like a charm; abating, commonly in a few days, the excessive intolerance of light and profuse epiphora, promoting the absorption of pustules, and hastening the cicatrisation of ulcers of the cornea. The use of this medicine may be begun as soon as the stomach has been cleared by an emetic, and the bowels put to rights by repeated doses of calomel with rhubarb, or some other such purgative, unless the pulse is very quick, when small doses of tartar emetic will be preferable, or when an impetiginous eruption is observed on the surface of the body, in which case a course of purgatives ought to be adopted."

Steel may be given with advantage in pallid and languid subjects. The carbonate of iron, the ferrum tartarisatum, the tinct. ferri ammon. and the vinum ferri are eligible forms.

The dilute sulphuric acid is a good tonic for scrofulous subjects, and may be combined with the vinum ferri.

In scrofulous cases the regulation of diet is very important, in regard to the quantity and quality of food, and the number of meals. Errors are often committed on these points, not only by patients, but even by their medical attendants. The notion has been entertained that scrofula consists in debility; and hence the inference has been drawn, that it is to be remedied by the free use of animal food and fermented liquors, of tonic and stimulating medicines. These views seem to me altogether erroneous, and the practice is decidedly pernicious. Scrofulous subjects are weak in one sense; they are imperfectly organized, and they cannot do and bear many things which others can. External agents affect them more powerfully; their organs are more easily excited, and this is particularly the case with the alimentary canal. Can we, then, expect that they should bear a quantity of meat, of stimulating liquors, and of tonics, that would surely disorder the stomach of a healthy and strong individual? The diet of the scrofulous, and indeed of young persons generally, should be nutritious, but not stimulating. The attempt to strengthen them by making the diet chiefly animal will never succeed. The mixture of animal and vegetable food has been found by the experience of all ages and countries, to be the best suited to the human organization. I see no reason whatever for prohibiting scrofulous subjects from taking vegetables; a moderate portion of animal food may be allowed once a day; and the rest of the diet may consist of well-dressed vegetables, ripe fruit, bread and milk, and farinaceous articles. Some of the more excitable scrofulous subjects cannot bear animal food daily; in such instances it may be allowed every second day. Fermented liquors, as wine or beer, may sometimes be allowed to children, in small quantity, and for a short time; but they are rarely admissible, even in the apparently weak subjects of struma, as they easily excite the circulation. The proper beverage for children generally is pure water. Many scrofulous subjects will not bear excitement either by food or medicine; tonics are injurious to them in all shapes. The quantity of food must be carefully attended to, especially where, in conjunction with disordered stomach and bowels, there is an unnatural appetite. Three or four meals may be taken daily, and nothing should be allowed in the intervals; particular care should be paid to keep off the unwholesome trash with which mistaken kindness often attempts to load the young stomach.

When the skin is pallid, dry, and harsh, and its capillary circulation and secretions are consequently imperfectly performed, we cannot expect an individual to be well; we cannot doubt that the restoration of this extensive surface to its proper state will materially conduce to the recovery of health and strength. Warm bathing is advantageous; where this cannot be accomplished, washing the body once daily with warm water, and rubbing it dry, may be substituted. Some salt may be added to the water; and its temperature may be gradually diminished till the cold or shower-bath can be borne.

Scrofulous subjects should be warmly clothed, especially in the colder part of the year. The attempt at hardening these weak beings by exposing them to cold and atmospherical vicissitudes, especially if they are lightly clad, is very dangerous. The animal powers, being naturally defective, cannot withstand these agencies. It is found by experiments on animals, that the power of generating heat is less in young subjects than in adults, and it is less in proportion to the early age of the individual. It is always desirable that scrofulous subjects should take exercise; and I would by no means confine them to the house, even in cold weather, but allow them to go out, protected by sufficient clothing. If children are left to themselves, they naturally engage in a variety of active sports, which sufficiently exercise their muscular system. When scrofulous disease exists, the principal object should be to re-establish and secure health; education should be considered as a matter of secondary importance, especially in those points which afford sedentary occupation.

Residence in pure air is of great importance to the scrofulous, and they often recover from serious disease, merely by being removed from large towns to the country or the sea-side. The air of the coast during the milder months of the year is advantageous to such constitutions. But the glare of light from the water and the sand is offensive to the eyes, so long as the intolerance continues; and a morbid sensibility, or, as it is called, weakness of the organ, often lasts after the other symptoms have been removed. A healthy inland situation is preferable to the coast under such circumstances. When, however, this particular source of inconvenience no longer exists, the air of the sea-side will be beneficial.

Local treatment, and other measures required by the state of the organ.—In the early period of the complaint, especially in cases which approach to common inflammation, and are attended with considerable redness and pain, a white tongue, and hot skin; or at any time when such symptoms may supervene, abstraction of blood by leeches, and their repeated application, may be necessary. In a severe attack, about or soon after puberty, cupping on the temple may be advisable. It may be expedient to administer an active aperient before leeching. Afterwards tartar emetic may be employed, either alone, or in combination with calomel or sulphate of magnesia. This remedy, given so as to produce vomiting or nausea, may sometimes supersede the abstraction of blood. The intolerance of light is not an indication for the use or repetition of leeches. This symptom has sometimes been regarded as a sign of inflammation, and hence depletion has been carried to unnecessary and injurious lengths. It increases the irritability of the organ, and aggravates the local symptoms, which are lessened by tonics and good diet.

Scarification has been recommended; but I have not practised it in these cases. In the commencement of the affection, when the neighbourhood of the organ and the head generally are hot, cold may be applied to the eye with advantage. But more commonly warm water or poppy fomentation is more comfortable to the patient's feelings. When the intolerance of light and spasm of the lids are considerable, they may be relieved by applying a bit of soft flannel wrung out of a strong decoction of poppies and chamomile-flowers, as warm as it can be borne.

The local employment of opium is resorted to when the last-mentioned symptoms are severe. The liquor opii sedativus of Mr. Battley is an eligible form. A dram of it may be added to an ounce of water, to be used tepid; a few drops may be allowed to pass between the lids. The steam of a mixture of tinct. opii ʒß. with mist. camphoræ ʒvii. ß may be applied to the organ.

Dr. SEEDS has recommended rubbing round the eye in various ophthalmiæ, a composition of Spirit. ether. sulph. comp. and Spirit. ammon. aromat. aa. ℥j. Spirit vin. camph. ʒj.* The vinum opii has not been found of much service.

Great benefit is derived from local stimuli after the inflammatory symptoms have been removed, and the alimentary canal has been brought into a healthy state. The solution of lunar caustic, from two to six grains to the ounce, dropped between the lids is the best, and has great influence in diminishing the irritability of the eye, and promoting the cicatrisation of ulcers. A stronger solution might be employed, if it could be applied to the ulcerated surface by a camel-hair brush.

The red precipitate ointment to the lids is a useful application.

After evacuations, counter irritation may be usefully employed, either by blister behind the ear or to the nape; or by the tartar emetic ointment. It is necessary to proceed cautiously with blisters in young subjects; they should not be left on longer than six or eight hours; nor is it safe to irritate the surface with the savine ointment. I have seen fatal mortification ensue from the neglect of these precautions. I prefer the ointment, as a more manageable and effectual means of accomplishing the object.

When change of structure is going on in the cornea, the part becoming red and opaque, mercury must be freely administered; and its beneficial influence in arresting disorganization will be most powerfully manifested, if it should affect the mouth. Calomel, or the hydrarg. c. creta. may be used; either alone, or in combination with James's powder, or with the pulvis ipecacuanhæ comp.

The treatment of the crusta lactea requires, in the inflammatory stage, aperients, and mild local applications; such as tepid ablution, spermaceti cerate, elder-flower ointment; afterwards, the oxyd of zinc, one dram to one ounce of rose-water, will soon dry up the pustules. The incrustations present at first a formidable appearance; but the complaint is quite superficial, and leaves no marks behind. Apprehensions of ill consequences have sometimes been entertained from the sudden removal of such an eruption; and these apprehensions are not groundless. It would be imprudent to stop the crusta lactea suddenly in the inflammatory stage, even if we could accomplish it; but when the excitement of this period has been removed by suitable internal and external remedies, there is no danger in the use of mild astringents.

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* *London Medical and Surgical Journal*, vol. i. p. 550 and 700.

CHAPTER XIII.

VARIOLOUS, MORBILLOUS, AND SCARLATINOUS OPHTHALMIA.

Analogies between the skin or common integuments of the body and the conjunctiva are observable in the natural structure of the parts, as well as in their common office of constituting the superficial covering of the frame. The conjunctiva of the negro has a dull, muddy hue; and it often displays, partially, a dark-brown, or black colour, gradually shaded off round the cornea. The separation of the surface of the eye with the epidermis generally, in the annual renewal of that covering in the serpent tribe and other reptiles, and the actual growth of hair from this membrane in the zemni, or mus typhlus, are further striking points of analogy. Hence we shall not be surprised at finding the conjunctiva participate in diseases of the skin, and at observing some of its morbid phenomena, which are only explicable when it is regarded as a part of the common integument. The infantile eruption called *crusta lactea* extends from the face to the surface of the eye. The eye-lids often suffer in venereal disease, as is more particularly explained in Chapter XIX. I have seen tubercles form on the conjunctiva oculi, and extend partially over the edge of the cornea in the tubercular elephantiasis. The analogy to the common integuments even shows itself as deep as the iris, the colours of which follow the same laws as those of the skin and hair: thus we have iritis accompanying some cutaneous affections. In no instance is the participation of the eye in diseases of the skin more strongly marked than in the contagious *exanthemata*, in all of which the eye suffers, sometimes very severely.

Variolous ophthalmia.—Small-pox is very injurious to the organ of vision, affecting different parts of the apparatus, and in various ways. It causes inflammation of the lids, of the eye, and of the lacrymal sac during the active period of the eruption; it produces an inflammation of the eye after the eruption has dried up; and it gives origin to chronic inflammation of the lids and of the nasal duct, and to strumous ophthalmia. Thus, from this single source of mischief arise active inflammations, which often destroy or impair sight, and chronic affections, which not only disfigure the individual, but continue more or less troublesome for many years.

Variolous pustules form on the external surface of the lids and on their ciliary margins. When they are numerous, as in bad cases, especially of confluent small-pox, they cause great swelling, and completely close the eyes. The oozing of matter and its incrustation, the agglutination of the palpebræ, and the confinement of the conjunctival and purulent secretions, irritate the eye, produce increased lacrymal discharge, and add to the sufferings of the patient. As the complaint declines the swelling subsides, the lids are opened, and the eye is found uninjured: thus we hear of persons being blind in small-pox for so many days, and then recovering their sight perfectly. They have been blind only as a person is who has a bandage tied over the eyes.

Although the globe may not have suffered, the lids are often greatly injured. The pustules on the ciliary margins partially destroy the cilia, alter the form of the part, making it uneven, and leave behind red marks, which are permanent through life. Eye-lids thus affected are liable to inflammation and excoriation from slight causes.

In addition to the general treatment, which the state of the patient may require, we should use such local means as may lessen irritation. We may evacuate the matter by pricking the pustules; we may carefully remove incrustations, after softening them with some mild unctuous applications; enjoin frequent ablution with tepid milk and water, and lessen inflammation by the application of soft rags moistened with cool or tepid washes.

It might be advantageous to adopt the proceeding recommended by M. VELPEAU, for the purpose of checking the development of the variolous pustule; this consists in touching the eruption in its early stage with a strong solution of nitrate of silver, or with the caustic in substance.

The greatest danger is to be apprehended when the inflammation extends from the lids to the globe, constituting *variolous ophthalmia*, properly so called, (*ophthalmia externa variolosa*,) that is, acute external inflammation of the eye, with variolous pustules on the cornea. The essential nature of the disease is the same in the cornea as in the skin; it is inflammation, so violent as quickly to produce suppuration, or even sloughing. This disorder, however acute and extensive, is of little consequence in the skin, so far as the organ itself is concerned, but its effects on the cornea are most destructive and serious. Suppuration and sloughing of this part are attended with the most severe general external inflammation of the eye, and the ultimate condition of the organ presents those changes which sufficiently prove the previous existence of such violent disturbance. Evacuation of the humours and collapse of the globe, staphyloma, prolapsus iridis, synechia anterior, contracted or closed pupil, opacities in various degree, blindness or injured sight, are the frequent consequences of this variolous ophthalmia.

As the eyes are closed by tumefaction of the lids, and consequently cannot be immediately inspected, it is difficult to determine whether the globe is inflamed or not, and to give an opinion on the important question of danger to sight. If the patient feels pain in the ball itself, with dryness, stiffness, and the sensation of sand or gravel in the eye, if the uneasiness be increased on attempting to move the eye-ball, and especially if it be aggravated on exposure to light, which will affect the organ powerfully even through the swelled palpebræ; and if, in addition to the purulent secretion of the pustules on the ciliary margins of the lids, there be increased lacrymal discharge, we may conclude that acute variolous inflammation exists, and that the organ is in the greatest danger. The absence of the symptoms just recited shows the affection to be confined to the lids.

The next question is, what can be done to avert the danger? BEER says, that when the eyes suffer from an affection common to them with the body generally, we must rely on the general treatment which the case may require; that we cannot adopt any particular measures for the affected organ, which must take its chance with the rest. If so violent and destructive an inflammation be thus left to itself, we need not be surprised at the numerous cases of blindness and injured sight from small-pox that come under our observation. I have had no opportunities of treating such cases in their active stage; but if I were to meet with them, I should adopt without hesitation that decided antiphlogistic treatment, which alone could offer any chance of saving the organ. General bleeding, leeches, free purging, cool or tepid washes, and frequent careful cleansing of the lids, would be the principal measures.

If the eyes should not have been affected during the eruption, they are not yet safe. A *secondary variolous ophthalmia* comes on after the desiccation of the pustules, when the scabs have fallen off; that is, in two, three, or four weeks after the apparent termination of the complaint. It is the same affection as the other, but in a milder form. One or more variolous pustules form on the cornea, producing suppuration, and general external inflammation. A dull whitish point is observed in the cornea, with surrounding haziness. The white appearance becomes extensive, and the part then turns yellow. If two or more such points should form, the entire cornea is rendered nebulous; or the latter effect may be produced from a single large variolous pustule. There is redness of the sclerotic coat, lacrymation, pain and increased sensibility to light.

The affection is not so violent in this secondary form as in that last described: it does not cause sloughing of the cornea. The part ulcerates, as in common suppuration: or, by arresting the inflammation, this ulceration may be prevented, and the matter absorbed. A permanent white cicatrix remains after ulceration, and opacity in some degree is left behind, when absorption has occurred. The surrounding haziness of the cornea is dissipated in either case, and thus vision is completely or partially recovered, where we might have expected, from the appearance of the cornea in the height of the inflammation, that it would be irreparably injured.

The necessity of active antiphlogistic treatment, and the propriety of steadily pursuing it, are so obvious, that they need not be further enforced. Remember that the corneal circulation is not easily controlled, and that perseverance is therefore required: consider too the importance, in the first place, of preventing suppuration, or, if it has occurred, of preventing ulceration.

In measles and scarlet fever, an external inflammation of the eye is common, but it is less severe in its nature, and less injurious in its consequences, than the variolous ophthalmia. There is the same relation in point of degree between the *ophthalmia morbillosa*, and *scarlatinosa*, and the variolous ophthalmia, as there is between the cutaneous inflammation in these several exanthemata. In measles and scarlet fever, the change which the skin undergoes amounts to little more than vascular congestion; and so in the inflammation of the eye, we have merely exterior redness of the organ, and vascular congestion of the conjunctiva and sclerotica, with pain, increased lacrymal discharge, and uneasiness on exposure to light. Sometimes pustules and ulcers form on the cornea; the vessels of the latter may enlarge and produce interstitial deposition into its texture. Together with the other symptoms there is, particularly in measles, catarrhal affection of the lining membrane of the nose and air passages, with sneezing and cough. The ophthalmic affection arises and proceeds with the cutaneous disorder. Ophthalmia is generally a companion of measles, although we may have the disorder of the skin without any affection of the eyes; there are instances of *rubeola sine catarrho*, as they have been termed. Inflammation of the eye is not so common in scarlet fever as in measles.

The affection of the eye in these cases does not usually require active treatment: we must protect it from light; direct some cool or tepid wash; purge the patient pretty freely; and this treatment will generally suffice. If, however, the inflammation should be more severe, a few leeches must be applied, and afterwards a blister behind the ear, or at the back of the neck. We are not to suppose, that because the affection of the eyes occurs in measles, they require no local means: we must observe the state of the organ, and regulate our proceedings by that. Ulceration and opacity of the cornea, and injured sight, may ensue from negligence. I have seen extensive ulceration and staphyloma, with loss of sight, in the ophthalmia following scarlatina.

CHAPTER XIV.

INFLAMMATION OF THE CORNEA.

Although the vessels of the cornea are not visible in the normal and perfectly transparent state of the texture, they become enlarged under inflammatory excitement, whether acute or chronic, and admit red blood; and they are sufficiently numerous to allow of the part becoming generally red under active or long-continued congestion. The various results of disturbed vascular action, such as union by adhesion, interstitial deposition, softening, thickening, induration, ulceration, cicatrisation, suppuration, mortification, occur in the cornea as rapidly and perfectly as in structures of which the vessels are larger, and apparently more numerous.

Inflammation of the cornea may be either acute or chronic; but its course and character are generally of the latter description; at least it produces interstitial deposition and opacity, or ulceration, much more frequently than the more serious results of suppuration and mortification. In general the appearances commence gradually and proceed slowly. The vessels of so dense a texture do not easily become enlarged; considerable excitement is necessary to produce this effect: hence the uneasiness is greater than the mere degree of visible change would lead us to expect. For the same reason recovery is tedious.

Inflammation may begin in the cornea, and either remain confined to its original seat, or extend to the neighbouring and connected parts; or it may commence in the sclerotica and conjunctiva, and spread to the cornea, the latter suffering as a part of the external coverings of the globe.

Its vessels may become enlarged, so as to admit red blood, under the influence of direct excitement in violent external inflammation. This is most frequently seen in young subjects. The vessels are so minute, that close observation, or the use of a glass, is sometimes necessary to show that the red appearance is vascular. They are closely arranged, and form, on the margin of the cornea, a band, which gradually becomes broader. The surface of the red part is a little elevated, as if the mucous membrane were slightly thickened. Whether these vessels are conjunctival, or situated in the corneal laminæ; whether they are derived from trunks belonging to the conjunctiva oculi, or from those situated between that membrane and the sclerotica, are questions which we cannot as yet satisfactorily answer. In a child, eight years of age, labouring under an attack of external ophthalmia, this state of the cornea was strongly marked. By two applications of leeches, and other antiphlogistic measures, the eye became well in a week. The distended vessels contracted, and the portion of cornea, which had been reddened, was again quite transparent.

I have already shown how the cornea is involved in external inflammations of the eye, particularly in the idiopathic affection of the external proper tunics, in the purulent, scrofulous, and variolous ophthalmiæ, and have described the phenomena and results of its mortification, suppuration, and ulceration, as well as those of effusion into its texture and opacity. I proceed to consider the cases in which the cornea is the original seat of mischief; the disease being then properly termed *corneitis*, (*ceratitis*, JUENGKEN; *keratitis*, ROSAS.)

Acute corneitis.—I suspect that variolous ophthalmia, particularly in its secondary form, commences with affection of the cornea, that is, with the formation of variolous pustule on it: but the inflammation, which is of acute character, so soon extends to the sclerotica, that when our attention is drawn to the case, it appears as an inflammation of the external tunics generally.

In the SIXTH CHAPTER, *on wounds of the eye*, at page 135, I have spoken of inflammation of the cornea as the consequence of mechanical injury, and have described both the milder form of the affection, and the more serious degree, which proceeds to suppuration and hypopyon.

Chronic corneitis is a common affection in young persons, particularly those of fair complexion, and of that delicate, weakly constitution which approaches to the scrofulous. The cornea loses its transparency, becoming of a dull grey colour, or like ground glass, and then exhibits the various degrees of change from haziness to nebula, or opacity so dense, as to conceal the iris and pupil, or to render them quite invisible. The opacity, which begins at the circumference, and gradually extends, is generally unequal, so as to give a cloudy or oky appearance, clearer portions being interspersed among more opaque parts. The opaque spots are sometimes of a yellowish colour, as if something like matter had been deposited; perhaps there is chronic suppuration in such cases. The surface of the cornea loses its polish, assuming a finely granulated appearance, as if it were covered with fine sand, or minute drops of dew. This change, which commences in the onset of the affection, with cloudiness or mistiness of vision, gives the eye a very dull appearance, even before there is much general opacity.

The circumference of the cornea assumes a brownish red tint, and appears on first view to be discoloured throughout its texture. Closer examination shows this apparent discolouration to arise from a countless multitude of minute vessels. The edge of the discoloured part is sometimes regularly defined, sometimes not: it may be broader at one part than at another. It is sometimes slightly elevated. The blood-vessels ramifying in the cornea are obviously derived from the sclerotic trunks. The conjunctiva often retains its natural paleness, while the vessels under it are turgid; and the whole sclerotica is covered by a plexus of distended ramifications, which form a pink zone round the cornea. There is a singular contrast in these cases, between the brownish red circumference, and the opaque interior of the cornea.

Considerable pain and sense of tightness in the eye, and pain in the brow or forehead, often accompany the affection, especially in its early stage, in which we find white tongue, headache, and general feverishness. There is increased sensibility to light, which is the more remarkable, as the changes in the cornea must diminish the quantity admitted into the eye: it must be remembered, that the sclerotica is involved in the inflammation, and that intolerance of light usually occurs when that membrane suffers. Vision is impaired in proportion to the degree of corneal opacity.

It may be questioned whether this is rightly called *chronic* inflammation. The pain and feverishness are often strongly marked. The particular form of the affection, that is, the enlargement and distension of the vessels, and the interstitial deposition, may arise from the peculiar structure of the corneal laminæ. The inflammation often proceeds with some rapidity, and is attended with feverishness. On the other hand, it is of long duration, often continuing for many months; and it does not proceed to suppuration. Often, after being attended with considerable pain, it assumes a more indolent character: the disease lasts, but the patient does not suffer.

The affection sometimes extends to the iris, and the margin of the pupil may become adherent to the crystalline capsule.

Treatment.—These cases require pretty active antiphlogistic measures. If stimulants and astringents are employed, as they sometimes have been, on account of the opacity, without a proper consideration of the other circumstances, the symptoms are aggravated, and the recovery is rendered difficult. The local abstraction of blood by cupping on the temples, or by leeches, and the other parts of the antiphlogistic plan, are necessary. The loss of blood must be repeated from time to time according to the symptoms. Subsequently, the use of mercury carried to the length of affecting the mouth, and the formation of an issue in the temple, are the most efficacious means of checking the inflammation, and restoring the transparency of the part. The occasional use of leeches may be combined with this plan. As the complaint is formed and proceeds slowly, the influence of treatment is gradual, and steady perseverance is necessary to insure success. When the treatment takes effect, and especially when the mercury acts decidedly, the vessels of the cornea contract, and the newly-deposited matter is absorbed, the cornea regaining its transparency, even where it had become generally and rather densely opaque. It clears first in the circumference, the favourable change gradually advancing towards the centre.

If the iris should participate in the affection, there is an additional reason for the use of mercury.

CASE.—A young woman, of pallid countenance and delicate frame, about twenty years of age, came to the London Ophthalmic Infirmary, complaining of loss of sight in the right eye. There was considerable general opacity of the cornea, which had destroyed all useful vision, redness of the sclerotic coat, uneasiness on exposure to light, and increased lacrymal discharge. She said that she had been ill six weeks; that she had been under the care of a surgeon in her neighbourhood, and that by his direction she had been putting drops into her eye, which made it very sore and painful; however, as she was directed to do so, she persevered in using them. When she showed me the prescription, I found that these drops were a solution of oxymuriate of mercury. In this case it was necessary to take blood by cupping repeatedly, to apply leeches several times, to use mercury freely, to put an issue in the temple, and to persevere in these measures, variously combined and repeated, for a long time before the inflammatory action was removed. The cornea had not completely regained its transparency, nor was the sight fully restored until nearly the end of a year, during the greater part of which time she was using mercury more or less actively. In a few months she came again to the infirmary, and said that she had the same complaint coming on in the left eye; she found the sight dim, and had considerable pain in the head; in short, the same symptoms which she had before complained of in the other eye. We had an opportunity of treating this eye from the first. We took blood from the temple by cupping, and employed the other treatment I have just particularised, and in six or eight weeks the complaint was completely put a stop to, although the cornea was generally nebulous when she came. The difference of treatment was very striking, and the results were equally so.

Partial inflammation of the cornea.—Most frequently inflammation affects the entire cornea, especially in young persons. Sometimes, however, about or after the time of puberty, the affection commences in one spot; other points become affected in succession, and thus disease may gradually extend over the whole. Pain has been felt in the eye; partial dulness is found at one point near the edge of the cornea; a little redness is seen on the external surface of the eye, corresponding to the nebula corneæ. On close inspection, this redness proves to be sclerotic, and the conjunctiva is unaltered: enlarged vessels are seen on the sclerotica, and we find minute ramifications extending from them upon the cornea. Another patch of nebula occurs, and ultimately the whole cornea, or the greater part of it, is affected.

CASE.—A young lady, about sixteen, of florid complexion and full habit, had an attack of external inflammation in the left eye, from which she had recovered under active treatment. She began to complain of the right eye: some of the sclerotic vessels were enlarged, and the corresponding portion of the cornea, near its margin, was nebulous. Active antiphlogistic treatment did not prevent the progress of the inflammation, and its extension into general inflammation of the cornea, for which a long continued course of treatment, by purgatives, mercury, and issue, was required.

CASE.—In a young boy, of rather pale and languid appearance, the same progress was observed. He had an attack of external inflammation, which got well, when partial corneitis came on, and gradually extended over nearly the whole cornea. It was accompanied with chronic iritis, and partial adhesion of the pupil took place. Issue in the temple, and mercury, ultimately removed the affection, but not till after a long time.

In another patient, near thirty years of age, of light complexion and pallid appearance, partial inflammation of the cornea showed itself first, and fresh portions of nebula appeared successively, till the affection became general. But in this, and in the last case, the inflammation was in roundish patches, the intervening portions being comparatively transparent. The central and most opaque part of these patches had a slight yellowish cast. Here too the iris was involved. The same treatment was successful.

In a young lady of delicate habit, about twenty-four, patches of opacity showed themselves in the lower half of the cornea. They were small, roundish, dense, and yellowish in the centre, and shaded off at the circumference. After antiphlogistic treatment, mercury and issue were employed. Considerable benefit was produced, when the mouth became affected. The treatment was interrupted, and relapse occurred; it was resumed, the mouth was again affected, and the influence was kept up for some weeks without much benefit. The affection, indeed, began to show itself in the upper portion of the cornea, which had been previously clear. I did not witness the termination of the case.

Local applications are not of much advantage. In the inflammatory period, and when intolerance exists, fomentations are most comfortable to the patient. Stimuli and astringents are hurtful so long as active inflammation exists. When that is removed, and the complaint is beginning to yield, the vinum opii, or the four grain solution of lunar caustic, may be tried, and a small portion of the mild red precipitate ointment may be introduced between the lids at night.

Inflammation of the cornea is not an unfrequent occurrence in strumous subjects. Although it is sometimes spoken of as a particular affection, under the name of *corneitis scrofulosa*,[*] its local characters do not differ essentially from the description already given. The affection is very obstinate; yielding difficultly to treatment, and liable to relapse. It is attended sometimes, after long continuance, with increased secretion of aqueus humor, and consequent enlargement of the anterior chamber. The treatment must be the same in principle as that already laid down, with such modifications as the strength and constitution of the patient may require. The general management pointed out, under the head of strumous ophthalmia, and the administration of sulphate of quinine, may be necessary.

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[*] The progress and phenomena of the affection, with some of its consequences, are well described and delineated by Dr. R. FRORIEP, in his Dissertation *de Corneitide Scrofulosa.*

CHAPTER XV.

INTERNAL INFLAMMATIONS OF THE EYE; ARTIFICIAL DILATATION OF THE PUPIL.

This is a part of the subject of the greatest importance. With much less external appearance of disease, with fewer visible marks of inflammation, with less to excite the attention of the patient or the alarm of friends, than in the external affections already described, there is much greater danger to vision. Slight alterations in the pupil, in the transparent media behind it, or in the retina, are sufficient to impair or destroy sight. These often take place without any external redness, without any changes visible to superficial observation. The commencement and progress of chronic internal inflammation are often most insidious; the existence of the affection, when confined to one eye, not being discovered till the change of structure is irreparable, and then only observed accidentally. This part of the subject has been much neglected by English writers, almost to the present time. Mr. Ware, the former great authority in these matters, in his treatise on the ophthalmy, does not even hint at inflammation of the internal parts. You might read him through without learning that the latter are even subject to inflammation; he does not seem to have been aware of the fact; a remarkable illustration of the difference between seeing and observing disease; or rather a proof that the most obvious things will not be seen unless persons know what to look for. The subject has been more accurately and successfully investigated by the Germans than by any others: they deserve the merit of having first observed, described, and discriminated the principal forms of internal ophthalmic inflammation.

Inflammation may be confined to one of the internal structures, or these may be involved altogether. The close connexion between the different internal parts, and their common vascular supply, are sufficient to account for the circumstance of inflammation spreading from one to another, and indeed make it difficult to understand how it is so often limited to one part. If inflammation commences in the iris, it easily extends to the ciliary body, choroid coat, vitreus humor, and retina; on the other hand, it will spread forward to the anterior part of the eye; so that a case of iritis often involves, in its progress, the greater part or the whole of the internal tunics, and the external parts also. Inflammation beginning in the retina spreads in like manner to the vitreous tunic, choroid, iris, &c. The phenomena of inflammation have been most accurately noticed as they present themselves in the iris, because it is immediately open to external observation; hence its history, progress, and treatment are best understood. We are not so fully acquainted with the appearances of inflammation in the retina, choroid coat, and vitreus humor; we cannot give so clear and satisfactory an account of choroiditis and retinitis, as these affections have been termed, as we can of iritis. We labour under peculiar disadvantages in the pathology of these parts; their internal position secludes them from observation during life, so that we do not see the actual changes which constitute the inflammatory state; and we have no opportunity of investigating these changes after death, because the affections do not destroy life. There are hardly any recorded dissections of such cases in the active state of inflammation. The few examinations hitherto made have been in instances of long standing blindness; hence they have only shown the ultimate effects, without elucidating the origin, progress, or primary state of the affections.

The observations which I shall have to make upon the internal inflammations of the eye I shall arrange in the following order; and shall speak,

1st. Of *Inflammation* of the cavities which contain the aqueus humor, the *anterior and posterior chambers* of the eye.

2dly. Of *Iritis*, or inflammation commencing in the iris.

3dly. Of *Inflammation* of the *internal tunics generally.*

4thly. Of *Inflammation* of the *posterior tunics of the eye*, as the membrane of the vitreus humor, the choroid coat, and retina; frequently occurring in arthritic subjects.

Artificial dilatation of the pupil.—The state of the pupil is one of the most important points in the internal ophthalmiæ; to preserve its circular figure, its natural dimensions, and permeability to light, is our principal object in most instances. Here we derive essential assistance from that anomalous and hitherto unexplained power, which certain narcotic vegetables possess, of acting upon the iris so as to dilate the pupil.* Before I describe the internal inflammations, I shall speak of the effect, which these substances produce on the eye. The power in question resides in the atropa belladonna,†, (deadly nightshade,) the hyoscyamus niger,‡ (henbane,) the lauro cerasus,§ (cherry laurel,) and the datura stramonium, (thorn apple.) It is found in the recently expressed juice of these vegetables, in an inspissated decoction of them, in the extract, or in the active narcotic principles, lately discovered by German chemists, and named by them hyoscyamine and atropia.[*] There are vegetables, somewhat analogous in their properties to these, which might therefore be expected to possess similar power; but they have not. This has been ascertained of the conium maculatum, aconitum napellus, and opium; also of the digitalis purpurea, arnica, rhus radicans, and saffron.[†]

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* The influence of belladonna on the pupil had been observed long ago, and is incidentally mentioned, as if it were well known, in a case of amaurosis, related in Arneman's *Magazin*, vol. i. Reimarus, who saw a striking instance of it, proposes to employ the application as a means of facilitating extraction of the cataract. See Baldinger, *Sylloge*, as quoted in the next note. But the attention of the profession was first expressly directed to the subject by Professor Himly, in some remarks on "*Paralysis of the iris by the local application of hyoscyamus, and the use of this remedy in the treatment of some diseases of the eye,*" published in his "*Ophthalmologische Beobachtungen*, Bremen, 1801. These were translated into French, and published at Altona in 1801, under the following title: "*De la paralysie de l'iris par une application locale de la jusquiame, et de son utilité dans le traitement de plusieurs maladies des yeux.*" Ehlers, who translated the observations of Himly, communicated their purport to Dubois, who used hyoscyamus to dilate the pupil in cataract operations in the following year at the Hôpital de Perfectionnement.

Himly has the merit of first seeing and clearly explaining the practical utility of this artificial dilatation in various states of the eye. It is so important in internal inflammations, by preventing contraction of the pupil; in the distinction of cataract from other affections; in discriminating the several species of cataract; in facilitating some of our operations, and as a palliative remedy in contractions and displacements of the pupil, and in many cases of glaucoma and cataract, that its introduction into practice by Professor Himly, may be deemed an important epoch in ophthalmic surgery.

Mr. Wishart has given a good account of the circumstances connected with this subject, historical as well as practical, in the ninth volume of the *Edinburgh Medical and Surgical Journal*, in a short paper, entitled "*Case of congenital cataract, with some observations on the means of artificially dilating the pupil in the operations of extracting and depressing the cataract.*"

† This effect of belladonna, which was known to our countryman, Ray, was observed in a young man, who had some of the fresh juice accidentally applied to the eyes. The pupils remained dilated for three weeks. See Baldinger, *Sylloge Opusculorum*, vol. ii. 1777.

‡ The fact was first noticed by Professor Himly, in 1799, in a case where the eyes had been bathed with a solution of hyoscyamus: see his *Ophthalmologische Beobachtungen*, quoted in the last note but one.

§ Conradi saw full dilatation of the pupil produced by the external application of cherry laurel water, as a remedy for opacity of the cornea. *Auswahl aus dem Tagebuche eines praktischen arztes*, Chemnitz, 1794, p. 23.

The usual mode of proceeding is either to rub the moistened extract on the brow, or to drop a solution of it in distilled water into the eye: the last is the most efficacious. A scruple of the extract of belladonna or of the extract of hyoscyamus should be rubbed down with an ounce of distilled water; the fluid should be filtered through linen, and two or three drops of it should be introduced between the lids. When the extract is employed, it should be brought to the consistence of honey by mixture with distilled water, and then copiously smeared on the upper lid, eye-brow, and neighbouring part of the forehead; after remaining for an hour, it may be washed off.

In the observations just quoted from the Edinburgh Journal, Dr. REISINGER expresses his opinion that a solution of the hyoscyamine or the atropia would be preferable to the other modes in which these narcotics have been used for dilating the pupil. His opinions and experience will be learned from the following passage:—

"In the first part of the Bavarian Annals for Surgery, Ophthalmic Medicine, and Midwifery, I endeavoured to draw the attention of German physicians to the narcotic principles of belladonna and hyoscyamus, discovered by BRANDES and RUNGE, and expressed my conviction of the great utility to be derived from these substances in several diseases of the eye, and preparatory to different operations, on account of their being stronger and more certain in their action than the extracts generally made from these plants. My expectations appear now to be realized; for, having found leisure to put them to the test of experiment, I have obtained the following results:—

"Hyoscyamine, prepared from the henbane seed, I found to be an extremely powerful substance for the dilatation of the pupil. A small drop of a solution of hyoscyamine (gr. i. to ℈ ß of water) was introduced into the eyes of some dogs and cats; the eye was scarcely at all irritated in any case, and the pupil was so considerably widened, that, an hour after the application of the solution, only a small ring of the iris could be seen beyond the edge of the cornea; and after three hours, the pupil appeared as large as the cornea itself, without the power of vision being diminished, or any other bad symptoms being induced, even when the solution was introduced into both eyes. After three days, the dilatation of the pupil first began to diminish; and it was not before the sixth day that the iris recovered its natural state. A drop of a solution of extract of hyoscyamus, containing five grains of the extract to half a scruple of water, produced in the same eyes a considerable irritation for the space of from five to eight minutes, which was shown by the secretion of tears, shutting of the eye-lids, rubbing of the eye-brows with the feet, &c.; and a much less complete dilatation of the pupil, which in dogs disappeared after six or eight, and in cats after twenty-four hours. As soon as we learnt by these experiments, which we frequently repeated, that the hyoscyamine did not in its action injure either the conjunctiva, or any of the deeper-seated organs, as for instance the retina, I proceeded to apply it on the human eye, and found that a drop of a solution of one grain of hyoscyamine, in a drachm of distilled water, applied to the eye of a cataract patient, seventy-one years old, produced such a dilatation of the pupil, that only a small ring of the iris was apparent. The pupil continued dilated seven days, during which time the old woman could see moderately well, and no irritation whatever was produced in any part of the eye. At another time, a drop of a solution of five grains of extract of hyoscyamus in half a scruple of water, applied to the same eye, produced a considerable burning, and only a moderate dilatation of the pupil after twelve hours. From other experiments with the hyoscyamine, we obtained nearly the same results. The hyoscyamine which was obtained from the stalk and leaves of the plant irritated the eye much more, and was less efficacious, than that obtained from the root."

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[*] *On the effects of Hyoscyamine and Atropia*, by Dr. F. REISINGER. Extracted from the *Medicinisch-chirurgische Zeitung*, February, 1826. *Edinburgh Medical and Surgical Journal*, vol. xxiv. p. 287.

[†] See BARATTA *Osservazioni practiche sulle principali Malattie degli occhi*, vol. i. cap. 4, and BENEDICT *Handbuch der praktischen Augen-heilkunde*, vol. i. p. 7—9. The latter author says that the lactuca virosa and pulsatilla nigricans produce slight dilatation.

When the organ is inflamed and painful, so that it will not bear any direct application to its surface, the moistened extract should be used; under other circumstances, dropping the solution into the eye is preferable, as being more powerful. If we wish to produce the greatest influence in the quickest manner, we may employ both methods at the same time.

The same substances will enlarge the pupil, when applied externally in the neighbourhood of the eye, as to an ulcer of the face,[*] or tongue,[†] or when taken into the stomach. In the case of a boy who had swallowed a teaspoonful of the moistened extract of belladonna, supposing it to be an electuary, and in whom a most alarming effect on the nervous system was produced, both pupils were dilated to the utmost, and continued so for two or three weeks.

The immediate effect of these narcotics is enlargement of the pupil, or, in other words, contraction of the iris, which at the same time loses its power of motion, so that the pupil remains dilated even in the strongest light: hence HIMLY has called it paralysis of the iris. The influence is generally produced in half an hour, or from that to an hour after the application to the eye, and the dilatation lasts for several hours or even some days. It is not uniform in all individuals, being greater in proportion to the healthy state of the eye, and sometimes so considerable as to reduce the iris to a narrow scarcely perceptible ring. Under such circumstances, vision becomes imperfect, sometimes to an alarming degree. This kind of amaurosis, which is analogous in its cause to the momentary dazzling and confusion of sight experienced in passing from a dark place into a strong light, goes off as the action of the iris returns, producing no permanent injury; as soon as the iris recovers its power of motion, vision is as perfect as before. I believe that the notion of the belladonna being injurious to vision[‡] is unfounded. The Germans, however, acting on this notion, use hyoscyamus, which has a more feeble and temporary influence. In this country, the belladonna is used almost exclusively, as the more powerful agent; the suspicions of its injurious influence seem to me to have arisen from its greater efficacy in dilating the pupil. I have known some instances in which it has been employed daily for many years: it has merely dilated the pupil, without injuring sight, or doing harm in any way. We learn too, from such cases, the important fact, that its influence on the iris is not diminished in the slightest degree by use. In two patients, of whom one had used it four or five and the other fourteen or fifteen years, it dilated the pupil just as well at the end as at the beginning of those periods.

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[*] RAY mentions in his *Historia Plantarum* (L. 13. c. xxiii.) that in a woman, who applied the leaves of belladonna to a cancerous ulcer below the eye, the pupil became dilated after each application.

[†] LANGENBECK, *Neue Chir. Bibliothek.*, vol. ii. p. 389.

[‡] BENEDICT, *De Morbis Oculi Inflammatoriis*, p. 116; see also his *Handbuch*, &c., vol. i. p. 7—9.

Patients have occasionally complained of pain or undefined uneasiness as following each employment of the belladonna; but it has sometimes appeared to me doubtful whether such sensations were caused by the application.

CHAPTER XVI.

INFLAMMATION OF THE ANTERIOR CHAMBER. HYPOPYON. PUNCTURE OF THE CORNEA.

SECTION 1.—INFLAMMATION OF THE ANTERIOR CHAMBER.

Synonymes: *Inflammation of the capsule of the aqueus humor;* WARDROP. *Aquo-capsulitis;* MACKENZIE. *Kerato-iritis;* ROSAS.

I HAVE called this disease, which forms a connecting link between the external and internal ophthalmia, *inflammation of the anterior chamber*, because the visible changes are nearly confined to that part. Probably, however, the inflammation occupies the posterior as well as the anterior chamber. It is accompanied by *hypopyon*, that is, by a formation of matter, which collects at the bottom of the anterior chamber.

External inflammation, involving the cornea, may extend to the anterior chamber, and thus the iris may become adherent to the cornea; again, inflammation commencing in the iris may spread over the cavity which contains it, and in this case hypopyon is sometimes produced.

The disease, however, which I am about to describe, is a primary affection of the cavity containing the aqueus humor, not extending to the more internal tunics, and affecting the exterior of the globe only secondarily. I used to see it frequently in children from two to eight years of age, at the London Ophthalmic Infirmary; it is not common in older subjects, and MR. MACKENZIE probably alludes to this circumstance, when he calls it a "rare ophthalmia."* Between the membrane of the aqueus humor and the serous membranes there is analogy of structure and disease. Both are equally prone to adhesive inflammation, that is, to the effusion, under various appearances, of the matters called albumen or coagulating lymph, and to their subsequent transformation into preternatural adhesions, or adventitious membranes.

Symptoms.—The cornea loses its transparency, exhibiting at first general dulness, then nebulous opacity more or less considerable; often there is an ulcer on its surface. The anterior chamber looks cloudy; but it is difficult to decide whether this appearance is owing to the state of the cornea or to a change in the aqueus humor. There is some, but not considerable external redness: it is chiefly in the form of a pink zone round the cornea. The colour of the iris is altered, it loses its brilliancy and fibrous character, and becomes dark and dull. The whole surface, or at least the inner circle, assumes a reddish brown tinge, and the pupillary margin becomes thickened. This reddish colour of the iris is more remarkable in blue or grey eyes. The pupil is rather contracted. An effusion of yellow matter takes place into the anterior chamber. There is a sense of tightness and fulness in the organ, and the patient complains of pain and aching in the eye and forehead; but this affection often happens in subjects who are too young to express their feelings. There is a white tongue, with some feverishness; these and the pain are confined to the commencement of the affection; so that, when the symptoms above described are fully developed, the patient is free from uneasiness, and opens the eye to the light without any appearance of intolerance. The progress is not very rapid; and it goes on for several days without the child suffering much.

MR. WARDROP, who calls the disease inflammation of the membrane of the aqueus humor, represents that the opacity is seated on the internal surface of the cornea, and that it consists chiefly of small roundish specks, which give the part a mottled appearance. I do not know whether this affection, as I have described it in children, ought to be considered as included in his account of the subject, which seems to have been drawn from the adult, and to include many of the cases usually called iritis. In the latter I have recognized the accuracy of MR. WARDROP's description, but I have not seen this particular modification of opacity in the child, in whom the cornea seems to suffer generally. It is enough to know practically that the opacity, whatever may be its seat, will disappear, when proper means have been adopted to remove the inflammation.

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* *Practical Treatise*, p. 472.

Another question has arisen respecting the effusion into the anterior chamber, whether it is rightly named pus. MR. WARDROP calls it albumen, considering it to be the same as that poured out on the iris, which causes adhesions. In the cases I have described the pupil does not become adherent.

Treatment.—The affection is easily controlled: it yields readily to simple measures. We begin with leeches and aperients, and then proceed to the mild administration of mercury. A grain of calomel combined with one or two grains of James's powder should be given twice, or, if necessary, three or four times in the twenty-four hours. Under this plan, which may be continued for a few days, the inflammation is soon removed, and the matter speedily disappears.

In the following case, which I relate because the affection is not common in the adult, the inflammation had been of long duration, but was soon arrested, with complete recovery of sight.

CASE.—On the 30th of May, 1826, I saw a young woman of twenty, who looked perfectly well, and stated that she was so. She had sometimes suffered from pains in the limbs, which had never been sufficiently severe to confine her. About a year before she had experienced severe pain in the head. Last Christmas her left eye began to be affected: it was painful and occasionally blood-shot, but not very red. Sight was dim. It had been impaired for the preceding two months. I found general haziness of the cornea, with several small roundish opaque dots, particularly towards the centre; these appeared to me to be in the internal surface of the cornea. The opacity was sufficient in degree to obscure the view of the iris, and especially of the pupil, which appeared contracted and adherent; but I could not determine the latter point. There was slight redness of the sclerotica round the margin of the cornea, and some pain on the same side of the head. There was no useful vision; and the patient was quite unable to read. I could discover no cause for the disease. (Twelve ounces of blood from the nape by cupping; a dose of calomel and jalap: pil.

hydr. g. v. every night; to abstain from fermented liquors.) 3rd June. Improved: (to take the pill night and morning.) 3rd July. The treatment has been continued to the present time with great improvement. The pain and redness are gone: the general haziness of the cornea has disappeared, and the dots are lessened. The iris and pupil are now clearly seen: the former is altered in colour, being lighter than that of the sound eye. The pupil is contracted, and rendered irregular by small white adhesions, but otherwise clear. She can read a small print with ease.

In a case seen by MR. MACKENZIE* the spots appeared and disappeared at different points of the cornea, even in the space of a few hours. I saw a lady of full habit, between fifty and sixty, in whom there was general haziness of the cornea with dotted opacity all over. Sight was lost. The inflammatory stage had completely subsided. She had recently employed stimuli, which had made her worse.

SECTION II.—HYPOPYON: (*Eiter-auge* of the Germans.)

The term hypopyon or hypopyum (from υπο, under, and πυον, pus) designates the presence in the anterior chamber of a yellow matter usually called pus, which it closely resembles in colour and general appearance, as well as in its inflammatory origin. I have mentioned this as a symptom of the affection last described, in which the inflamed membrane of the aqueus humor pours out the matter. More frequently it proceeds from the bursting of a corneal abscess, when it is seen in conjunction with more or less opacity of the cornea and acute inflammation of the external tunics. Abscess of the iris, breaking into the anterior chamber, may produce hypopyon, which may also occur in iritis not proceeding to suppuration, in inflammation of the internal tunics, and in general inflammation of the globe; the circumstance common to the three latter affections, and leading to the occurrence of hypopyon, being inflammation of the membrane lining the chambers of the aqueus humor. When matter is effused behind the iris, as well as in front, the case is called *empyesis oculi*, which is equivalent to suppuration of the eye. Hypopyon, then, is not to be regarded as a peculiar disease of the eye; like the formation of matter in other parts, it is the occasional result of various inflammatory affections.*

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* *Practical Treatise*, p. 471.

The matter of hypopyon, being heavier than the aqueus humor, sinks to the bottom of the anterior chamber, forming a collection, of which the superior surface is a horizontal level line, while the inferior boundary, being formed by the margin of the cornea, is crescent shaped. Sometimes the upper line is not level; the matter is in lumps, and appears heaped up. This is particularly the case in abscess of the cornea, where we see occasionally a stratum of thick matter continued from the aperture to the collection below. In some instances the puriform fluid changes its level, when the head is moved to one side; but in general it is too thick and viscid. Sometimes, when the inflammation is very violent, and the matter in heaps, an admixture of blood in small quantity is seen.

It is hardly necessary to observe, that the inflammations, in which matter is effused into the anterior chamber, must be treated on the same principles as other ophthalmiæ; that we can depend on nothing but active antiphlogistic treatment for preventing the occurrence, or arresting the progress of hypopyon. The only question that remains is, whether the presence of matter behind the cornea requires any particular course of proceeding; whether we ought to follow the practice that has been usually recommended, of puncturing the cornea to evacuate the matter, on the supposition of its having some noxious influence on the parts with which it is in contact.

The practice of the late Mr. WARE was very singular. He treated hypopyon with powdered sugar blown into the eye, with vinum opii, leeches, blisters and washes. If the quantity of matter be large, or if it should increase, instead of diminishing, it will be necessary, he says, "without delay, to make an incision through the inferior part of the cornea, in order to discharge it. This incision will be best performed in the manner used for dividing the cornea, in the operation of extracting the cataract." He adds, that the opening in the cornea may close and the matter collect again; the best mode of preventing which is to take care that the first incision shall be sufficiently large; but if it should happen, the cornea must be again opened, and so on *toties quoties*. The perusal of this extraordinary advice prepares us, in some measure, for what follows. Delay in performing the operation above recommended, "may issue in the total destruction of the cornea, and, of consequence, the irrecoverable loss of sight." "In this last and worst stage of the complaint, should it unfortunately have arisen to this height, nothing remains but to open a way for the discharge of the morbid matter, together with the vitiated humours, either by making a large aperture sideways through all the tunics of the eye, or, if the diseased state of the cornea make it necessary, by removing the whole of its anterior portion."[*]

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* The division of hypopyon into the *true* and the *spurious* may be discarded, as not resting on any satisfactory grounds. BEER gives the name *true* to that which is produced by acute inflammation of the eye, accompanied with fever; while he says that the *false* is an effusion of puriform fluid not produced by true inflammation.—*Bibliotheca Ophthalmica*, vol. i. p. 53. RICHTER enumerates five kinds of true hypopyon; four of them are various suppurations of the cornea, the fifth and principal is formation of matter in the chambers from acute inflammation —*Anfangsgründe*, vol. iii. § 79—87. He then specifies three kinds of spurious hypopyon; 1st, effusion of matter into the anterior chamber without inflammation; 2ndly, from metastasis, as in suppressed clap; 3rdly, from abscess of the cornea bursting internally. § 90—91. BENEDICT calls true hypopyon an effusion from the inflamed iris, without abscess or ulcer; false, the consequence of abscess in the iris.—*Handbuch*, vol. i. p. 390. True hypopyon, according to JUENGKEN, is inflammatory abscess of the globe; false, is a collection in the chambers of matter from an ulcer or wound of the cornea, or an abscess of the iris.—*Lehre*, p. 404—6.

RICHTER[†] recommends the evacuation of the matter by incision of the cornea, generally, as the best mode of treating hypopyon. He says that "as the matter is tough and thick, the incision must not be small. It must be exactly like that for the extraction of the cataract; but it need not be quite so large. It is enough to divide the cornea in one-third of its circumference."[‡]

LANGENBECK[§] and BENEDICT[‖] follow the same practice.

In his earlier writings, BEER[¶] recommended letting out the matter: he appeals to his great experience, and will hardly condescend to notice objections. "Any one," says he, "who has successfully and completely cured by incision so many cases as I have, will not think it worth while to hear or read, and much less to refute such objections." Subsequent observation induced him to change his opinion completely, and to reprobate the incision in equally strong terms. "When matter shows itself in the anterior chamber, the surgeon must on no account think of opening the cornea; for the eye would certainly be much injured." I am sorry to say that the treatment he recommends is quite as objectionable as the discarded operation; it consists of dry warmth to the part, laudanum dropped between the lids, and blisters, combined with calamus aromaticus, naphtha, opium, and in urgent cases bark![*]

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[*] *Remarks on the Ophthalmy, &c.* 5th Ed. p. 74—76, and Cases 5 and 6.

[†] *Anfangsgründe*, vol. iii. § 92.

[‡] *Ibid.* § 99.

[§] *Neue bibliothek*, vol. i. p. 182.

[‖] *Handbuch der Augenheilkunde*, vol. i. pp. 359 and 393.

[¶] *Bibliotheca ophthalmica*, t. i. pp. 41 and 98.

SCARPA[†] judiciously advises active antiphlogistic treatment, observing that the matter will be absorbed after the inflammation has been removed; and he rejects the operation because it aggravates the inflammation, and gives rise to greater evils than the hypopyon itself.

WALTHER rightly observes that the operation for hypopyon should not be thought of until the secretion of matter in the corneal abscess has ceased, or the inflammation of the chambers is at an end.[‡] If he had proceeded to say that it is then unnecessary, he would have spoken more consistently with his own principles; for he shows how actively absorption goes on in the anterior chamber. He chooses for the operation the very period when, in consequence of inflammation having ceased, nothing is wanted to complete the cure but a little time for absorption; and when the effused matter, according to his own description of its viscid, dirty-yellow, half-dried and lumpy state,[§] could not be extracted without difficulty.

I lay it down as an invariable rule not to puncture the cornea in hypopyon. Inflammation must be arrested by suitable means, and the effusion will be rapidly absorbed. If the matter increases, depend on it that the inflammation continues. Can an incision of the cornea be considered a good remedy for inflammation? It is much more calculated to increase than diminish the local disturbance; and as a means, merely of getting rid of the matter, it is unnecessary, because the absorbents are very competent to that duty. I never saw an instance of hypopyon in children, where the puncture of the cornea was necessary, or even justifiable. These cases invariably do well under the treatment I have described. I have seen the anterior chamber punctured for hypoyon in the adult, but never with any beneficial result that might not have been obtained without it. These reasons are sufficient against the practice. There is still another, namely, that the matter is so thick, it will not in general come out. I suppose that the believers in its noxious properties would endeavour to squeeze or scrape it out.[*] The only exception I make to the general rule of not puncturing the cornea is in the case of general suppuration of the globe; but here the eye is lost, and we relieve the patient by giving exit to the matter.

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[*] *Lehre*, vol. i. p. 430.

[†] *Treatise*, p. 267. and following.

[‡] *Merkwürdige Heilung*, &c. pp. 18 and 66—69.

[§] *Ibid.* p. 69.

SECTION III.—EVACUATIÒN OF THE AQUEUS HUMOR.

In connexion with this question of opening the cornea to let out the matter of hypopyon, I shall mention the subject of puncturing it to discharge the aqueus humor, as a remedy in some inflammations, and in certain states of the cornea. We are indebted to Mr. Wardrop for this ingenious proposal, which was suggested to his active mind by a singular phenomenon in the dead eye, which I have mentioned in describing the anatomy of the organ, viz. the milkiness of the cornea produced by squeezing the globe, and the return of its transparency when the pressure is removed.[†] It immediately occurred to him, that vascular distension of the internal tunics during life, might cause a similar general cloudiness of the cornea, and that this could be removed by that diminution of the contents, which escape of the aqueus humor would produce. In trying it with this view, he found it a source of so much relief to the patient, that he was led to employ it extensively in various cases, where there is tension of the globe; and he has found the results so advantageous as to induce him to continue the frequent use of the plan, although it does not appear clearly that it has ever had any marked effect in remedying opacity. Relief of pain, removal of the sense of tightness, diminution in the size of the blood vessels, and improved vision, are the effects of the operation, when it acts beneficially.

It may be performed, either with a cataract knife or needle:

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[*] "When an opening is made in the cornea to let out the matter of hypopyon, we become sensible of its tough viscid nature; for a part only escapes at the moment, while the more consistent portion is discharged gradually, sometimes not without the assistance of art."—Benedict, *lib. cit.* p. 393.

[†] *Observations on the effects of evacuating the aqueus humor in inflammation of the eyes; and on the changes produced in the transparency of the cornea, from the increase or diminution of the contents of the eye-ball.*—Edin. Med. and Surg. Journal, vol. iii. p. 56.

the instrument should be introduced near the margin of the cornea, with its flat surface parallel to the plane of the iris, and carried on till the point enters the anterior chamber, when it may be turned on its axis, particularly if it be a needle, to facilitate the escape of the fluid. It should be immediately withdrawn, as soon as that is accomplished, care being taken to remove it before the iris can fall against it. The knife is the best instrument for the purpose, as it makes a larger aperture, the sides of which will separate so as to allow a repetition of the discharge, if the chamber should become again distended. The chief difficulty of the operation arises from the painful state of the inflamed organ, which is aggravated by the pressure necessary for keeping the lids open to expose the ball. The upper lid should be fixed by the fingers of an assistant, or by Pellier's speculum. The operator, with the fore and middle fingers of one hand presses down the under eye-lid, and applies their points over the tarsus, so that they touch the eye-ball, and can apply such pressure as may be necessary to steady it.

Mr. WARDROP recommends the operation in gonorrhœal and purulent ophthalmia, whether of the newly-born infant or adult, in cases where the membrane secreting the aqueus humor is inflamed, in inflammation of the external proper tunics, in staphyloma, and in prolapsus iridis, in inflammation consequent on injuries, in some kinds of opacity, in some cases of ulcer, and in all instances of hypopyon. In the latter, he says that it is sometimes necessary to make an incision nearly equal to that for the extraction of the lens. I must observe, that he does not recommend it in any instance as the sole or principal, but only as an auxiliary measure of treatment; and that he by no means proposes it, in the severe forms of inflammation in which he has used it, with the view of superseding the active antiphlogistic measures, which are obviously required in such cases.

The paper of Mr. WARDROP in the fourth volume of the *Medico-chirurgical Transactions*,* like every thing he writes, is interesting and instructive; it contains a valuable series of cases. I must, at the same time, candidly state, that my opinion of the operation is by no means so favourable as his. I have tried it in some instances, but with so little benefit, that I have not been induced to persist in the practice; and I have been the less inclined to do so in severe inflammations of the organ, because the ordinary antiphlogistic treatment enables us to control them. I think so highly of Mr. Wardrop's knowledge and judgment, and rely so implicitly on all that he relates, that I doubt my own conclusions when I find them at variance with his experience. Let me observe, however, that although the puncture, regarded as an operation, may be spoken of lightly, it is not so trivial as to induce us to do it, unless with decided expectation of benefit. It is often difficult to fix the eye for any operation, and the pain and irritability of severe inflammation do not make this easier; the swelling of the eye-lids in some instances offers a serious obstacle. Cases have occurred where the instrument has been carried as far as the pupil, in which the lens and iris have been pushed forcibly against it, and cataract has been produced; an event which, indeed, is chargeable to unskilfulness, but its possibility must be taken into account in estimating an operation proposed for so great a number of affections: (see page 141, note.) The puncture has not been injurious in any case where I have practised it.

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* *On the effects of evacuating the aqueus humor in inflammation of the eyes, and in some diseases of the cornea*, p. 142.

Mr. Maccregor[*] performed the operation twenty-three times in purulent ophthalmia with results so favourable as to induce him to recommend it strongly. He says, "it is to be regretted that this operation is not more frequently performed; for I am convinced that many persons have lost their sight from a rupture of the cornea taking place in front of the pupil, which a timely and judicious performance of this operation might have prevented."

Mueller[†] speaks favourably of the puncture, which he had performed eighteen times in cases of purulent ophthalmia. Langenbeck[‡] thinks well of the proceeding on the faith of three or four cases in which he had recourse to it.

Benedict regards it as the principal measure in the treatment of iritis,[§] considering it applicable only where inflammation has affected both chambers. He employs it in every period of acute and subacute iritis, with or without hypopyon, when bleeding and other means have failed to relieve. It must be repeated as often as inflammation and pain return; three, four, or more times.[||]

Rosas[¶] has found it injurious in acute iritis.

I believe that it is but little practised at the present moment, either in this country or in Germany.

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[*] *Transactions of a society*, &c. vol. iii. p. 59, 60.

[†] *Erfahrungssätze*, p. 147.

[‡] *Neue chir. bibl.* p. 177.

[§] *Handbuch*, p. 409, 410

[||] *Handbuch*, vol. i. p. 408.

[¶] *Ibid.* vol. ii. p. 446.

CHAPTER XVII.

IRITIS.

INFLAMMATION of the iris was, I believe, first described by JOHN ADAM SCHMIDT, professor at the Josephine Academy in Vienna, who designated it by the term *Iritis*. His Essay,[*] published in 1801, contains an excellent description, which has not yet been surpassed, of inflammation of the iris, and its various results. To some of these he acknowledges that his attention had been directed by his teacher and friend Professor BARTH,[†] who founded the school of Ophthalmic Surgery at Vienna, and raised it to a high degree of excellence. When the clear account of the phenomena, progress and consequences of iritis, contained in the work of SCHMIDT, is contrasted with the entire ignorance which then prevailed, in this and other countries, on the same subject, we shall become sensible how far the Germans have preceded all other nations in cultivating the ophthalmic department of medicine. It appears incidentally that SCHMIDT was acquainted with the syphilitic and other forms of iritis, although he has spoken of the affection generally, and more especially for the purpose of illustrating some of the consequences which occasionally follow operations for cataract. Inflammation of the iris is not mentioned in the third volume of RICHTER's *Elements of Surgery*, which was published in 1795, and treats of diseases of the eye; it is not alluded to in the first edition of BEER's work[‡] on Diseases of the Eye, which appeared in 1792. In his second and enlarged edition,[§] which is quite a different book from the first, **Beer** has treated the subject at considerable length; and the Germans in general have been well acquainted with iritis and its varieties since the appearance of **Schmidt**'s Essay already quoted, and through the practical lessons afforded in the admirable ophthalmic school of Vienna.

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[*] *Ueber Nachstaar, und Iritis nach Staar-operationen*, 4to. A good analysis of this Essay may be seen in first volume of the *Quarterly Journal of Foreign Medicine and Surgery*; the intelligent writer gives a general account of the views entertained by the German practitioners on the subject of iritis.

[†] Page 62 of the work last quoted, note.

[‡] *Lehre der Augenkrankheiten*, Vienna, 2 vols. 8vo. 1792. The observations on venereal inflammations of the eye in this work are quite unworthy of the celebrity which BEER afterwards acquired in this department of surgery; they are either vague and unsatisfactory, or erroneous. See vol. i. sect. 425—437.

[§] The two volumes of the second edition were published separately, in 1813 and 1817.

SECTION I.—GENERAL ACCOUNT OF IRITIS AND ITS TREATMENT.

General character of iritis.—The chambers of the aqueus humor, having a smooth membranous lining, which exhales and absorbs a watery fluid, present a striking analogy to the serous cavities. A similar correspondence is observed in their diseases; inflammation being generally attended in the former, as it is in the serous membranes, by the effusion either of albuminous fluid, or of coagulating lymph. The peculiar structure and the situation of the affected part will, perhaps, account satisfactorily for our not being able to recognise in iritis the four circumstances, the combination of which is usually considered to constitute the state of inflammation; viz. swelling, redness, heat, and pain. The inflammatory process, however, is unequivocally characterised by one of its effects; that is, by effusion from the vessels of the part. The new matter thus produced, which is found under various circumstances and appearances, is called indiscriminately by the not very precise term of *coagulable lymph*. Besides changing the colour and general appearance of the iris, it impairs and destroys its motions, rendering it at first sluggish and afterwards motionless; it causes adhesion of the iris to the surrounding parts; it alters the form and size of the pupil, contracting or entirely obstructing that aperture, with more or less injury, or complete loss of sight. Thus iritis belongs to the class of adhesive inflammations. The increased action in the vessels of the part, by which the changes just enumerated are produced, is attended by an enlargement of the vascular trunks and ramifications on the sclerotic coat, and, consequently, by preternatural redness of the eye, to which are usually added increased sensibility to light, and lacrymal discharge.

Change of colour in the iris.—The change of colour which the organ undergoes, is one of the most striking characters of iritis. A light coloured iris assumes, under inflammation, a yellowish or greenish tint; occasionally, it is distinctly yellow; and, if the eye be blue, a bright green is sometimes seen. Generally, however, the tint, whether yellow or green, is of a dull and muddy cast, and darker than in the sound state. In case of the iris being naturally dark-coloured, it presents, when inflamed, a reddish tinge. Together with these changes of colour, there is a complete loss of its natural brilliancy; it becomes dull and dark, and the beautiful fibrous arrangement, which characterises it in the healthy state, is either confused or entirely lost. These changes, which are rendered particularly obvious by the contrast between the inflamed and the sound eye, commence in the pupillary margin. In an early period, the very edge of the pupil alone may be affected; the internal circle then becomes altered in colour, and thickened; and afterwards, the change spreads gradually to the external or ciliary edge of the iris. This alteration of colour is produced by effusion into the texture of the organ; and the particular tint is such as would arise from blending with the natural colour of the iris that of the lymph, which is yellowish or brownish.

Effusion of lymph ;—its various appearances.—The deposition of lymph in iritis shows itself under various forms: 1st. Its effusion into the texture of the iris causes the changes of colour just described. 2ndly. It may be deposited in a thin layer, covering a larger or smaller surface. In this way, the edge of the pupil first, and subsequently the lesser circle of the iris, assume a reddish brown or rusty colour in the beginning of the affection. The discoloured part has a rough villous appearance, when closely inspected, and we shall generally find, on careful examination, more particularly on looking at the part sideways, that slight elevation and irregularity of surface are produced by this new deposit. Sometimes the stratum of lymph has a light yellowish brown or ochrey tint, and a loose villous texture, rising into obviously prominent masses. The rusty colour is the most common, and is observed particularly in blue irides; the other is seen in the grey, or the mixture of grey and orange. This kind of deposit is generally confined to the inner circle of the iris; but the outer circle is usually, at the same time, more or less discoloured and dull. 3rdly, The lymph may be effused in distinct masses, that is, in small drops or tubercles of a yellowish or reddish brown colour; sometimes they are of a bright red, and sometimes yellowish. They vary in size from that of a pin's-head to a split-pea. Often there is only one there may be two, three, or more. They may be deposited on the edge of the pupil, or in any part of the anterior surface of the iris. When the inflammation is very active, and has been neglected or improperly treated, the lymph is sometimes secreted so abundantly, as nearly to fill the anterior chamber; in which case it has a light dirty yellowish tint, and often a looseness of texture, with semi-transparency. 4thly. As the iris swells or is pushed forwards in the anterior chamber, its surface being sometimes partially concealed by a thin cloud, while the cornea is losing its transparency, suppuration may take place, and a true abscess of the iris may be produced. At one or more points a small bright yellow, whitish or reddish yellow prominence slowly arises from the surface of the iris; assuming a regularly rounded surface. It breaks and pours out matter, which sinks to the bottom of the anterior chamber, and forms hypopyon. Little shreds of the yellow cyst, after hanging from the iris for several days, at last disappear.[*] 5thly. Effusion may take place into the anterior chamber under the form of hypopyon. 6thly. Under violent inflammatory action, blood itself is sometimes effused, and is mixed, in a coagulated state, with the tubercular masses of lymph, or with the yellow abscesses. I have seen such effusion of blood where the inflammation has not been of the most violent kind. 7thly. Lymph may be poured out from the margin of the pupil or the uvea, so as to agglutinate them partially or generally to the capsule of the crystalline. A mass of lymph sometimes fills the pupil. More commonly, a thin greyish web or film stretches across the opening, which loses its clear black colour, and has a cloudy appearance. Lymph may be effused in considerable quantity into the posterior chamber, and either make its way through the pupil into the anterior chamber, cause a bulging of the sclerotica, or penetrate that membrane, and form a tumour under the conjunctiva.[†] I have lately seen an instance of the last description, in a tailor, who had eruptions and inflammation of the eye after a chancre. These symptoms got better, but the eye relapsed in consequence of the patient resuming his occupation prematurely. I found the iris nearly in contact with the cornea; some red vessels were visible in it. The lower and inner half of the anterior chamber was filled with semi-opaque light yellowish lymph; and a small portion of coagulated blood was seen near the ciliary edge of the iris. Lymph of similar appearance was partially visible behind the pupil, towards the nasal side. On the same side of the globe, the conjunctiva was raised into a tumour about the size of a pea; and, from the appearance of its contents, through the membrane, there could be no doubt that they consisted of lymph. Such was the state of the eye at the end of about three months. When I saw the patient again, after an interval of five or six weeks, the globe had begun to shrink: the conjunctiva oculi was intensely red, the cornea opake, with a reddish tinge, so that lymph in the anterior chamber could be discerned through it with difficulty, and the protrusion of the conjunctiva continued of the same size, the brownish yellow lymph that it contained being more distinctly visible.

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[*] The abscess of the iris is well represented by Beer in *Lehre*, tab. ii. fig. 1. Tab. i. fig. 6; tab. ii. fig. 4—5; and tab. iii. fig. 1, are excellent views of iritis in other forms.

[†] Cases illustrating these occurrences are detailed in my *Treatise on the Venereal Diseases of the Eye*, pp. 216 and 223.

The external swelling in these cases has sometimes a yellowish appearance on its most prominent part, from which, in conjunction with the intense redness and violent pain of the eye, it has been supposed that suppuration of the globe had occurred; and the part has been punctured, under that notion. I once did this in the case of a lady, whose eye was destroyed by syphilitic inflammation: neither matter nor lymph escaped from the opening.[*] A case, in which a similar attempt was made with the like result, is related in the posthumous work of MR. SAUNDERS,[†] and illustrated by a coloured figure of the organ. It may, I believe, be asserted, that suppuration never takes place in syphilitic iritis; that the inflammation, however violent, is always of the adhesive kind; and that the changes, to which it leads, are produced by the effusion of lymph. Nor, indeed, have I seen general suppuration of the globe as an effect of iritis in any form.

The effusion into the texture of the iris, which causes a general change in its appearance, and the reddish brown discolouration of the inner circle, with thickening of the pupillary margin, are generally the first alterations observed in this inflammation; they may take place separately, but are usually conjoined. In a case, which was of rather a chronic type, the greater circle of the iris retained nearly its natural colour, while the lesser was reddish brown or rusty-coloured.

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[*] The particulars are detailed by Dr. FARRE in a letter to Mr. TRAVERS:—See COOPER and TRAVERS's *Surgical Essays*, Pt. i. p. 93—96.

[†] *Treatise on some Practical Points, &c.* 2nd ed. pl. i. fig. 3; and p. 213.

In another, the whole iris, which was naturally blue, had become dark, dull, and muddy, while the pupillary margin and inner circle were of a rusty brown. As the inflammation proceeds, the tubercular masses appear: thus in one case the whole iris was dull and discoloured, the inner circle being of a rusty brown, and a large mass of reddish lymph was deposited on it; in another, the irides were so discoloured, dark, and muddy, that their natural appearance could not be estimated; the inner circle rusty brown; the edge of the pupil thick and villous; while about one-third of each was covered by a prominent mass of bright reddish brown lymph. In the most violent degree, large effusion takes place into the anterior, or posterior chamber, and the pupil.

The progress of the affection was clearly marked in an instance, where proper treatment was neglected; we seldom see it so distinctly, as the complaint is usually arrested by the means we adopt. In this patient, the iris, at the end of nine days, and on the 16th August, had completely lost its blue colour, and had a dull, muddy appearance, without any trace of the natural fibrous structure: the inner circle was reddish brown, while, in the outer, this tint was mixed with a dull yellowish colour. On the 20th, a mass of light-coloured lymph was effused, and the general discolouration was more striking. Another effusion took place on the 27th. The two portions were united on the 30th, and increased to one light brownish yellow deposition, covering the lower half of the iris. On the 21st Sept. the inflammation, which had been removed, recurred, and lymph was again effused, increasing in quantity to the 25th. In the following March, nearly the whole anterior chamber was filled with lymph. Since the several modifications of effusion depend on the degree of inflammation, and not on any difference in the nature of the process, we see them combined together in greater or smaller number according to the stage which the affection has reached, and the effect of the measures which have been adopted. Occasionally, however, we may observe that the inflammation, although violent and of long standing, is characterized by general discolouration, alone, or with the addition of a thin stratum of lymph on the inner circle of the iris; while, in some instances, the tubercular deposition of lymph takes place with hardly any other observable change in the iris.*

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* The cases illustrating the various points in this and the preceding paragraph will be found in my *Treatise* last quoted.

Motions of the iris, and state of the pupil —The motions of the iris must be seriously impaired by the changes just described, more particularly by the interstitial effusion of lymph. It moves sluggishly at the commencement of the inflammation; and, when effusion has taken place, its movements are entirely suspended, the preternatural connexions by adhesion concurring with the change of structure in producing this effect. The pupil, consequently, cannot exhibit the ordinary variations in size; it is contracted, and it becomes smaller and smaller in the progress of the affection. At the same time the effusions of lymph and the adhesions change the figure of the opening, rendering it angular, and often extremely irregular. Together with other changes, the pupil sometimes undergoes an apparent alteration in situation, its margin being fixed at one or more points, and free elsewhere. The margin of the aperture is thickened, and has a villous or spongy appearance in the beginning of the disease, presenting a strong contrast to the thin, sharp, and well defined edge which naturally belongs to it. The effusion of lymph into the aperture, which has been already noticed, destroys its clear black colour, and gives it a dull, cloudy appearance.

Increased redness of the eye.—There is more or less external redness of the eye, in the form of a red band round the cornea, deeper-coloured in front, and gradually shaded off behind; the circumference of the globe being comparatively clear. In the commencement of the affection, the anterior part of the sclerotica exhibits a pale pink redness, and the vascular trunks, which lie on this membrane, are seen, of a deeper pink tint, under the conjunctiva, which is then unaltered. The pink tint of the inflamed sclerotica and of the trunks lying on it, which is observed in all inflammations of the membrane, is probably owing to their being covered by, and consequently seen through, the conjunctiva. These vessels advance in nearly straight lines from the circumference of the globe, ramifying towards the front, and are lost in the pink zone. The redness of the sclerotica, and the distension of its trunks, increase as the affection proceeds. The vessels of the conjunctiva soon become partially enlarged, towards the anterior part of the eye; they are distinguished, by their scarlet colour, from those lying on the sclerotica; they subdivide minutely, and their fine ramifications, which are very closely arranged, combine with the pink redness of the sclerotica to form the vascular zone round the cornea. The minute vessels terminate abruptly at the edge of the cornea, under which they probably pass to the iris: the limits of the zone are, therefore, clearly marked in front, while it is gradually shaded off behind; it differs in breadth in different instances. It is of a deep vivid red in acute iritis, when fully developed, the circumference of the globe being paler as the conjunctival vessels are less distended. In iritis of the most violent kind, however, all the external vessels of the globe are equally affected, giving to the entire surface a uniform fiery redness.

The red zone lasts as long as the inflammation of the iris continues, and disappears when that is removed; its origin, progress, degree, and termination, manifestly depending on the iritic affection. The whole iris is usually the seat of inflammation, but not necessarily so; one point only may be inflamed, and then the redness of the sclerotica is confined to the part opposite to the inflamed portion of the iris; again, when the iris is inflamed generally, it sometimes happens that the excitement is more violent in one part, and the external redness will be greater opposite to that part.

State of the cornea and aqueus humor.—The phenomena of the disease show that an intimate vascular connexion exists between the sclerotica and the cornea and iris, although we do not know much about the arrangement or communications of their vessels in the healthy state of the organ. Hence it happens that active inflammation in either of the latter parts causes vascular distension and redness of the sclerotic, while inflammation originating in that membrane soon extends to them. When the sclerotica is inflamed, as it is in an acute attack of iritis, change may be anticipated in the state of the cornea. General haziness occurs at first; this is aggravated, as the case proceeds, and nebulous opacity comes on when the inflammation is violent and long continued. This change affects the cornea generally, in most cases; there may be more considerable partial opacity with the general haziness or nebula. Sometimes, but rarely, there is ulceration of the cornea. These corneal affections add to the imperfection of sight caused by the changes in the pupil. Under the existence of inflammation in the surfaces, which secrete the aqueus humor, we might expect that this fluid would be altered in its properties, and become turbid. We have, however, no clear evidence on this point. In considerable and active inflammation of the iris, with the cornea remaining clear, we can see no change in the aqueous fluid: when the cornea becomes hazy or opaque, we can hardly expect to discern it.

Intolerance of light, and pain.—There is generally some, and often considerable intolerance in the beginning, and in the early progress of the affection, together with increased lacrymal discharge, the tears flowing freely on exposure of the eye to light. These symptoms are probably owing to the participation of the sclerotica in the affection; and they continue, although the quantity of light admitted into the eye is constantly diminishing, in consequence of the changes produced in the pupil and the cornea. This was exemplified in a case which I have related elsewhere, where distress was experienced on approaching the light, although it was doubtful whether the patient could distinguish light from darkness, except from this circumstance.*

There is generally more or less pain from the commencement, the degree varying according to the acuteness of the attack. It may be considerable, with burning sensation and tension; deep-seated in the globe and orbit, extending to the head, and so severe as to prevent rest entirely. Thus, in one case, there was no rest for three or four days in consequence of unremitting and most severe pain in the organ, and over the brow, and intense general head-ache. On the other hand, it may be slight, even when considerable effusion of lymph and loss of sight have occurred. Thus, in another instance, the iris of the left eye was in contact with the cornea, the sclerotica was bulged by effusion of lymph behind the iris, and sight was destroyed; these changes, however, had been produced by inflammation of chronic character, and accompanied with so little pain, as not to interrupt rest. In two cases the local appearances were those of the most acute inflammation: in one of them there were large effusions of lymph in both eyes, with the highest degree of vascular turgescence: yet these patients did not complain, and even when questioned, said that they had no pain. In another patient, although a mass of lymph was effused on the iris of the right eye, the patient not only had experienced no pain in the organ, but was not even aware that any disease existed in it.† Patients often complain of great pain in the temple, brow, or cheek, as if it were seated in the bone. The pain is often most severe at night.

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* *Treatise on the Ven. Dis. of the Eye*, p. 259.

† *Ibid.* p. 270.

Dimness of sight occurs in the commencement of iritis. The changes in the pupil and cornea render vision more and more imperfect, so that the patient ultimately cannot see the largest print, discern objects, or even distinguish light and darkness.

General symptoms.—The constitutional disturbance is very various. Iritis of the most acute kind is attended with severe febrile symptoms; with head-ache, restlessness, and want of sleep; with full and strong pulse; white tongue, thirst, loss of appetite, and costiveness. Often, however, even in cases that would be termed acute, such symptoms exist only in a slight degree, or are entirely wanting.

Progress and extension of the inflammation.—During the occurrence of the changes just described, which might be divided into two stages, that of *congestion* and that of *effusion*, the iris swells, or appears to swell; that is, it approaches towards the cornea, becoming convex in front, diminishing the anterior chamber, and sometimes having its surface puckered and irregular. Is this an actual swelling of the iris, real thickening of the part from interstitial deposition? or mere protrusion by the swelling of parts behind, by the effusion of lymph, or by aqueous secretion? Dissection has not yet elucidated these questions. Does this protrusion of the iris ever occur, except in conjunction with adhesion of the entire pupillary margin, and consequent intercepted communication between the two chambers? I rather think not; but cannot speak positively.

If the progress of the affection be not checked, it does not remain limited to its original seat in the iris. At first it appears on the very border of the pupil; then shows itself on the inner circle; and subsequently extends to the outer circle, presenting the combination of symptoms already described. Supposing it to go on without interruption, it passes from the ciliary circumference of the iris to the corpus ciliare, the choroid coat and retina, with increase of pain and fever, and ultimately with irrecoverable loss of vision, from change of structure in the retina. At the same time, the mischief is propagated forwards; the cornea becomes more opaque, the conjunctiva more inflamed, and great external redness is added to all the other symptoms, so that the case, which was at first simple iritis, becomes ultimately ophthalmitis, or inflammation involving the external and internal tunics generally.

The question naturally occurs, whether the inflammation, when thus propagated to the posterior tunics, presents in them the same characters as in its original seat; that is, whether it is attended by effusion of lymph? I have never had an opportunity of dissecting an eye in this state of disease, nor are any such dissections recorded. The escape of lymph through the sclerotica, which has been already mentioned, and the bulging of the globe at some distance behind the cornea, in cases where it is disorganized by this inflammation, which certainly is not owing to suppuration, would lead us to suppose that the question ought to be answered in the affirmative. Sometimes the internal tunics suffer generally from the beginning; and vision is impaired, although the pupil may remain clear. The term iritis, implying that disease is confined to one texture, is not properly applied to such cases.

Effects of iritis—Gradual recovery.—The effusion into the texture, or on the surface of the iris, like the interstitial deposition which produces swelling of other inflamed parts, is removed by absorption when the inflammation is at an end. Under favourable circumstances, that is, when the inflammation is recent, and proper treatment has been adopted, the iris may be completely restored, recovering its natural colour, brilliancy, and power of motion. This restoration may take place equally whether the organ should have been simply discoloured, or effusion of lymph should have taken place, either in a thin stratum or in tubercular masses.

Change of texture and colour in the iris.—Where the inflammation has been more violent, and of longer duration, we shall find that it has produced serious changes of structure, which come under our observation when the active excitement has subsided. General adhesion of the iris to the cornea, with considerable change of the latter, may lead to staphyloma; or the eye may be flattened anteriorly, if the iris should have become adherent on both surfaces: but these are not ordinary consequences of iritis. I have seen dropsical enlargement of the anterior chamber *(hydrophthalmus anterior)* with closed pupil, and staphyloma scleroticæ, as results of the disease.

When the disorder has been of the most acute description, and particularly after repeated attacks, when it has affected the entire iris, great disorganization is the consequence. The colour and texture are so much altered, that there is no resemblance to a healthy iris. The pupillary margin is adherent throughout to the capsule of the lens; the iris no longer forms a level partition between the two chambers, but is elevated into a convex protuberance, which is puckered in various places. It has commonly a dull leaden colour, and white, apparently tough, fibres are intermixed. It has not yet been ascertained whether the iris be thickened in these cases, or pushed forwards by a secretion behind. The cornea may be clear, or more or less opaque. Vision is irrecoverably lost: for, whenever the inflammation is sufficiently violent to produce such changes, it will be found to have extended to the retina, and to have rendered it insensible.

In other cases the effects are less considerable: but the continuance for some weeks of slighter inflammation will produce permanent change in the texture of the iris, causing alteration of its colour, diminution of its lustre, and confusion of its fibrous structure, so that it presents a striking contrast to the sound iris. Sometimes it is marked with small dark specks; sometimes it has, almost throughout, a dull leaden hue. These organic changes concur with the adhesions of the pupil in lessening or destroying the motions of the part.

Adhesions of the pupil.—The lymph effused in iritis, like that poured out on the surface of an inflamed serous membrane, soon becomes organised, producing new formations of a permanent character. Thus, when the inner circle of the inflamed iris has regained its natural appearance by the progress of absorption, the edge of the pupil is found preternaturally fixed to the crystalline capsule. It may be closely attached at one or more points, the rest of the circle being free. More commonly the connexion is effected by slender threads, long enough to allow some motion; there may be many of these fringing the whole opening, or only one. Such adhesions are dark coloured; that is, they are of the same colour as the edge of the pupil or the uvea, partaking, like other adventitious formations, of the nature of the surface which produces them. Under suitable treatment, in an early stage, adhesions of the pupil are sometimes detached, leaving behind, at least in some instances, black marks on the capsule, which I believe are permanent. These marks escape notice in consequence of the blackness of the pupil; they are, however, sometimes detected on close examination with a strong light on the eye. I have seen a complete circular series of such marks, which I discovered while accidentally examining the eye with the sun shining upon it. The patient had laboured under iritis; and the pupil, which had been fixed to the capsule in its whole circumference, was completely liberated by the means employed. A tubercle of lymph effused on the edge of the pupil will produce a broader adhesion, fixing, perhaps, one-third or one-fourth of the circle. The changes now described must necessarily affect the figure and motions of the pupil: they often render it very irregular, and impair or destroy its motions. Mere alterations of figure are not injurious to vision; which is just as good with the most irregularly shaped pupil as with a circular one; and we often see perfect vision with great and permanent contraction of this aperture. It must be understood, of course, that the retina is uninjured, and that the pupil, however irregular or small, is clear.

Adventitious membrane in the pupil.—If the lymph thrown out into the pupil, and lying on the crystalline capsule, be not soon absorbed, it becomes organised, and forms an opaque adventitious membrane adherent to the capsule and to the pupil, and corresponding in size to the dimensions of the pupil at the time of effusion. The opacity of this new production is greatest in the centre, and gradually shaded off towards the circumference. In the contracted state of the pupil; it fills the whole aperture; but, when the edge of the iris is withdrawn, it is surrounded, partially or entirely, by a clear black margin, and the iris is found to be attached to it by adhesions, which may be either close, or in the form of short black threads. These adhesions sometimes divide the clear portion of the pupil into small roundish or irregular apertures In such cases, the pupil does not change under variations in the quantity of light; it is usually necessary to apply belladonna in order to expose the clear part of the opening, and the adhesions which connect its margin to the adventitious membrane. If the effusion should have occupied the pupil and margin of the iris only partially, the adventitious membrane will be found towards one side instead of the centre, the edge of the pupil being fixed to it, and thus drawn out of its regular line, while the rest of the opening is natural. This state, which has been called imperfect closure of the pupil, *(atresia iridis imperfecta,)* is attended with greater or less injury of sight. Although the patient may have no useful vision when the aperture is contracted, he may be able even to read if a little enlargement can be procured by the influence of belladonna.

Closure of the pupil.—When large effusion has taken place into the posterior chamber, it is organised into a dense opaque substance, to which the entire circumference of the pupil is closely fixed, the opening itself being greatly contracted, or actually shut, and generally removed more or less from the centre of the iris. By this complete closure of the pupil, (*atresia iridis perfecta,*) the communication between the two chambers is destroyed, and the passage of light into the eye almost entirely intercepted, with corresponding loss of sight. By means of the adventitious membrane thus produced, the uvea may be rendered generally adherent to the crystalline capsule; and there may be a large anterior chamber: or the iris may have been previously pushed forwards and in contact with the cornea, so as to destroy the anterior chamber.

Atrophy of the globe, and fluidity of the vitreus humor.—When large effusion has occurred into both chambers, and when lymph has been deposited behind the iris in such quantity as to cause bulging of the sclerotica, or to escape through that membrane and raise the conjunctiva into a swelling, it will be completely removed by absorption, when the inflammation has ceased. But the internal parts of the globe are so altered in structure, that it becomes flaccid, and reduced in size; (*atrophia bulbi.*) This change sometimes takes place after complete closure of the pupil. A fluid state of the vitreus humor (*synchisis*) and consequent softness of the globe may take place after acute syphilitic iritis of long standing, without shrinking in size or atrophy.

Impaired vision.—When the inflammation has extended to the posterior tunics, although it should have been arrested by proper treatment, it often leaves behind imperfection of sight in various degrees; and this may take place in cases of chronic, as well as of acute character. In an instance, where the inflammation was treated rather actively, and lasted a month, several thread-like adhesions of the pupil were produced, and the opening was contracted, but quite clear. The patient could read in a good light, but found a mistiness and dimness before the eye. Both eyes were affected in another patient, the inflammation being of a decidedly chronic character in the right, with very slight redness, and no heat or pain. At the end of ten weeks the pupil, which was clear, was fringed by short dark adhesions, and the patient could only make out large print with difficulty. His sight was afterwards improved, but he could not read a small print by candlelight. In two instances, adventitious membranes were formed in the pupils, leaving, however, in the dilated state, sufficient marginal openings of clear black colour for the purposes of vision: one of these patients could distinguish the letters of middle-sized print; but vision was much more imperfect in the other.

After the apparent cure of the disorder, the eye sometimes remains preternaturally sensible to external influences. It will become red, and water, with some pain, on exposure to cold and damp, or after exertion. This is more particularly observed when the inflammation has been considerable, and has lasted long, in consequence of neglect or injudicious treatment; and thus the patient may experience repeated and troublesome relapses of the affection.

Causes.—The causes of iritis are the same as those of other ophthalmic inflammations. In the first place, direct injuries, such as wounds and various surgical operations, particularly those of cataract and artificial pupil. Secondly, over exertion, as in the long employment of the organ on minute or bright objects: in this way it may occur in those, whose occupations are attended with continued exertion of the sight. We cannot point out how it happens that the same kind of injurious influence should, in one instance, produce iritis, in another, affection of the retina. We observe, however, that iritis is easily excited in unhealthy states of the constitution, such as the gouty and rheumatic, and that produced by syphilis. Observation discloses to us the fact, that in these cases there is a strong disposition to disease in certain textures; but I can assign no satisfactory reason for the iris being included among these, unless the observations on gonorrhœal and rheumatic ophthalmia should be considered as elucidating the subject. See Chapter X., section 3.

I have heard it asserted that iritis never occurs with obvious effusion of lymph, except under the unsound states of constitution already specified. In corroboration of this remark, I may observe that iritis is rare in young subjects, in whom these states of constitution do not exist; it is comparatively uncommon before puberty. The iris may beome affected by extension of inflammation from the external tunics under neglect or improper treatment; but I am speaking of primary iritis, that is, of inflammation commencing in that part, which is a rare affection in young persons. I have seen some instances of the disease, accompanied with tubercular effusions of lymph in children; but the patients have exhibited obvious marks of unhealthy constitution; and a few examples have come under my notice of iritis in infants not apparently unhealthy, where closure of the pupil has taken place from effusion of lymph.

The same external circumstances, such as cold, wet, particular states of atmosphere, which are capable of exciting gout and rheumatism in other forms, may bring on iritis in the predisposed; but it often appears in such subjects without any obvious local agency.

In the same way, syphilitic iritis generally appears to us as the simple offspring of the morbid poison. The only reason we can assign for its occurrence, is the previous existence of primary syphilis, or, to use the ordinary language, the contamination of the body by the venereal poison. When we come to understand the nature and operation of that change, to which syphilitic affections of the throat, skin, bones, and other parts owe their origin, we shall probably be able to explain the occurrence of syphilitic iritis. It may occasionally happen, as some have represented, that cold, wet, and other external influences will immediately excite the complaint in those who are already disposed to it by having previously contracted syphilis; but it appears, in most cases, without any assignable external cause.

According to BEER, syphilitic inflammation of the eye may arise in two ways. External influences, even though slight in degree, and such as would probably be uninjurious to a person in good health, will, he says, excite inflammation of the eye in a syphilitic person. This may at first be a rheumatic or a traumatic inflammation, and may be transformed in two or three days into syphilitic iritis; or, particularly if the constitution be thoroughly affected with lues, syphilitic iritis appears at once under its proper character. This last he calls *primary* or *genuine*, the former *secondary* syphilitic iritis.* I have not seen this metamorphosis of disease; nor do I believe that there is any ground for the distinction.

Whether iritis is caused by the use of mercury.—An opinion has partially prevailed that the use of mercury is capable of producing iritis; if so, it is both bane and antidote; for we know that it will cure the disease Some have considered that syphilitic iritis, as well as other secondary symptoms, either are rendered more frequent and severe by the employment of this remedy, or owe their very existence to it; while others have spoken of iritis generally as being caused by it.

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* *Lehre*, vol. i. § 547, 548.

I have seen no instance of iritis, of whatever kind, in which there has appeared to me any reason for ascribing the occurrence of the complaint to this cause. In nine of the cases related in my *Treatise on Venereal Diseases of the Eye*,[*] iritis came on where no mercury had been taken previously to its appearance; and in some of them the complaint was severe, and produced consequences injurious to vision; in nine others, mercury had been administered only in small quantity, and the mouth had not been made sore; and there is not one in the whole list in which the remedy had either been employed for a long time, or affected the system severely. Iritis occurred in some of the cases which had been treated by Mr. Rose and Dr. John Thomson without mercury.[†] Dr. Ekström, of Stockholm, informed me that he had seen many similar instances in the patients of an institution where the use of mercury in syphilis had been entirely abandoned for a long time. Iritis took place in a woman, who had contracted syphilis from suckling a diseased infant, and had taken no mercury.[‡]

Prognosis.—This is favourable when the affection is recent, and confined to its original seat in the iris. Continuance of the inflammation is attended with increasing contraction of the pupil, with augmented effusion of lymph, and with its organisation into those adhesions and adventitious opaque substances, which, together with the contraction of the pupil, so frequently injure or destroy sight. In the progress of the affection, further injurious consequences arise: the inflammation extends to the posterior parts of the globe, including the retina, with the greatest danger to vision; also to the cornea, which may become more or less opaque.

We need not entertain apprehension for the result, if the changes, however considerable, are confined to the iris. The inflammation may be arrested; and then extensive alterations of colour, large effusions of lymph, and great contraction of the pupil will be removed. The mere quantity of effusion is of little moment.

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[*] Page 165.

[†] *Medico-Chirurgical Transactions*, vol. viii. p. 361, and Cases xvii.—xix. *Edin. Med. and Surg. Journal*, vol. xiv. p. 91.

[‡] *Medico-Chirurgical Review*, August, 1829.—The patient had suckled the child of another woman, who was known to have had the venereal disease. The child, about six weeks after birth, had ulcers of the mouth and blotches on the trunk, and when in this condition it was applied to the patient's breast. Soon afterwards, a sore formed near the nipple, with a smooth and slightly excavated surface, thin discharge, indurated basis, and great pain: a gland in the axilla swelled to the size of a chesnut. In seven weeks, no mercury having been used, either internally or locally, iritis of the left eye came on. It yielded speedily, as did the primary symptoms, to calomel and opium, under which the mouth became sore.

Before pronouncing the prognosis, we should closely examine the organ in order to decide the question whether the posterior tunics are involved. The state of vision alone will not determine the point: the changes in the cornea and pupil may impair sight considerably, so that the patient may be unable to distinguish objects, and may be reduced to the mere power of discriminating light and darkness, in cases where the function of the organ is ultimately restored. Indeed, a considerably impaired state of vision is sometimes found where the cornea is clear, and the pupil not visibly obstructed, and yet the sense is recovered; so that even affection of the retina is not necessarily a ground of unfavourable prognosis. The case is hopeless when we find a change of colour in the whole iris, with considerable contraction of the pupil and an opaque substance in it, with intense external redness, great and deep-seated pain, and complete extinction of sight. I have not seen vision recovered when large effusion has taken place behind the iris, more particularly if it should have caused bulging of the sclerotica, or have made its way through that membrane. Great contraction and general adhesion of the pupil, a protruded and puckered state of the iris, are very unfavourable circumstances. Considerable imperfection of sight may be removed if the inflammation be recent, but not if it be of long standing. Cases differ so much in the degree of disturbance, and the rate of progress, that we can hardly speak of definite periods. We confidently expect to arrest the inflammation and remove its effects when iritis has lasted a fortnight or three weeks; and we often succeed in cases of a middle kind as to severity, at the end of a month. In a case, where the inflammation had existed six weeks, and the patient could not make out large print without much difficulty, complete and permanent recovery was effected. In another, where inflammation of active character had gone on for six weeks, the recovery of sight was nearly perfect. Much improvement of sight was accomplished in a third, although the affection had lasted nearly ten weeks. We must take a combined view of the activity and duration of the inflammation before we decide on the probable termination. The power of treatment is very great: much good is often accomplished in cases that seem almost desperate: we must therefore be on our guard against delivering hastily an unfavourable opinion.

Treatment —The three principal objects which we have in view, namely, to arrest the inflammation of the organ; to prevent the further effusion of lymph, and promote the absorption of that which has been already poured out; and to prevent the contraction of the pupil, may be accomplished by antiphlogistic measures, by the administration of mercury, and by the use of belladonna.

Antiphlogistic means, particularly loss of blood.—It can hardly be necessary to enforce at length the propriety of resorting immediately to active treatment when violent inflammation attacks the delicately organised internal parts of the eye. Whenever, therefore, the inflammation is acute, with great vascular congestion, severe pain, and constitutional disturbance; when we have reason to fear that inflammation may extend from the iris to the posterior tunics, and more particularly if we should suppose that such extension has already occurred, we must immediately adopt the most active antiphlogistic treatment in all its parts; that is, we must bleed generally and locally, repeating the evacuation until the inflammation is subdued, clear the alimentary canal by an active purge, following it by saline aperients and the tartrite of antimony, put the patient on low diet, guard the eye from all injurious external influences, and keep the body at rest as well as the affected organ. When the disorder is less violent, the local abstraction of blood by cupping or leeches will supersede the use of the lancet. The latter, however, may be advantageously employed in many instances, which, from the duration of the complaint and the local symptoms, would not be considered as of the most acute kind. General depletion may be had recourse to with propriety whenever there is feverishness, particularly if the pulse be full and strong. I must observe, however, that the absence of such symptoms does not contra-indicate the practice. If the local complaint be serious, and threaten mischief to the organ, the treatment may properly begin with loss of blood from the arm, unless there should be objections in the particular circumstances of the case; in the progress of the affection we should not hesitate to repeat the depletion whenever the state of the part, or of the system, or both, call for it.

Local applications.—These cannot be of much service in so serious an affection of parts comparatively internal: tepid washes, such as the poppy fomentation, will perhaps be the most soothing to the patient, who may, however, employ cold applications, if he finds them more agreeable.

Blisters.—The use of blisters is not proper in this active state of the inflammation; they often add to the excitement, instead of lessening it, particularly if they are applied near to the inflamed organ.

Mercury.—The measures now described lessen the violence of the inflammation, remove or greatly diminish the agonizing pain in the part and in the head, moderate the accompanying general excitement, and thus give great relief to the patient. But they fail, at least in many instances, to accomplish the second object. We frequently see, after large and repeated bleeding, that the action of the capillary vessels, the essential agents of the mischief, continues; the effusion of lymph goes on, and leads to the alterations of structure, which have been already described. Some further power is necessary to put a stop to this disorganizing and destructive process, and that power is afforded by mercury, not however when employed as a purge merely, nor in those small doses, given at considerable intervals, which have been called alterative, but in such a way as to produce quickly a decided effect upon the system. The mercurial action, when thus effectively and speedily produced, cuts short the inflammation, and puts a stop to the effusion of lymph, when that which is already effused will be absorbed; thus, it not only prevents further changes, but remedies those already produced. The redness of the eye diminishes, and sudden relief is experienced by the patient; the lymph, in whatever form it may have been effused, begins to lessen, and is soon removed; the distinct masses are absorbed; the adventitious layer is removed from the pupil; the colour of the iris is restored last. The red zone round the cornea begins to look pale, and soon disappears. Small doses of mercury are quite inadequate to the production of these changes, and I do not know how it has happened that such doses have been called alterative, for they certainly will produce no alteration in a decided inflammatory attack of this kind; while, on the contrary, if any such effect is to be caused by mercury, it must be employed freely. After the loss of blood, either from the arm, or locally by cupping and leeches, and after clearing out the bowels by purgative medicines, the use of mercury may be commenced; and the best way of employing it is in the combination of calomel with opium, two, three, or four grains of the former with one-fourth, one-third, or half a grain of the latter, every eight, six, or, in urgent cases, every four hours. In this plan of proceeding, the influence of the remedy on the system will soon be perceived. Under particular circumstances, blue pill, the hydrargyrum c. creta, or mercurial frictions may be employed instead of calomel.

Two important questions present themselves respecting the mode of conducting this part of the treatment; first, to what extent mercury should be used; and secondly, how long it should be continued. The more powerful its action on the system, the more effectually does it controul the disease, putting a stop to the excitement of the capillary circulation, diminishing the size of the distended vessels, preventing the further effusion of lymph, and its organization into those new structures, which are so injurious to sight. Sometimes these ends are not accomplished by a slight action on the mouth, when a more powerful influence will quickly do the business. Full salivation, quickly produced, cuts short recent disease, as if by a charm. The remedy may then be suspended, and its effects allowed to subside slowly, which will take two or three weeks: it will not be necessary to give any more mercury. Although the disease yields more quickly and effectually to a powerful mercurial action, it will be sufficient, in general, to make the remedy sensible in the mouth. In cases of longer standing its influence is not so quickly effectual. We must persevere until the lymph is absorbed, until the natural colour of the iris returns, the red zone round the cornea is gone, and vision is restored. This will require four, six, or eight weeks in some instances. A longer time is usually necessary in relapses and second attacks, than on the first occurrence of the complaint. I attended a gentleman for an attack of syphilitic iritis, in which the disease was of chronic character; it yielded slowly, and was well in six weeks. It recurred in consequence of premature exposure to cold, and the patient was obliged to keep the house for twelve weeks in a state of salivation, recovering perfect vision, which has continued unimpaired from that time, now many years ago.

The questions will naturally occur, why this affection should require a different treatment from other inflammations? whether iritis may not be cured by simple antiphlogistic means? and whether the employment of mercury be absolutely necessary? To the latter there can be no hesitation in giving a negative reply. Iritis may go through its course and come to an end without any treatment; but, when thus left to itself, it often produces effects more or less seriously injurious to vision, such as contraction and adhesions of the pupils, obstruction of them by adventitious membranes, and large effusion behind the iris, with total loss of sight.

Again, the affection may be controlled and brought to a conclusion by the common antiphlogistic means.[*]

CASE.—A patient, thirty-two years of age, was admitted into St. Bartholomew's hospital, under my care, on the 1st of October, 1829, with superficial sores round the orifice of the prepuce, and superficial ulceration of the velum palati and tonsils. He was ordered to take a blue pill night and morning, and the compound decoction of sarsaparilla; and to apply the black wash. On the 7th, his mouth not having been affected by the mercury, the right iris became inflamed; the attack was not severe, nor attended with much pain. Sixteen ounces of blood were taken from the temple by cupping, and active aperients were administered. On the 9th, there was a tubercle of yellowish brown lymph on the iris, with dimness of sight. The cupping was repeated to the same quantity. On the 14th twelve leeches were applied to the temple; and he left the hospital on the 19th perfectly well; the eye had recovered completely.

In another case, where both eyes were inflamed, active antiphlogistic treatment was employed, and the patient became very pale and feeble from the loss of blood. The right eye recovered, but the inflammation continued in the left, with increased pain and lacrymation, and progressive diminution of vision, until mercury was exhibited and carried to the extent of ptyalism.

In general, however, simple antiphlogistic treatment is not so effectual, as it was in the foregoing case, in arresting the effusion of lymph. Hence, when we trust to such means only, although the inflammation may not be violent, the pupil will contract, and lymph will be thrown out: the disease may be checked and subside, leaving the organ apparently recovered, but the adhesions and adventitious membranes resulting from the organisation of the newly deposited substance will permanently injure vision. Many years ago I treated a case of iritis in St. Bartholomew's Hospital without mercury: the inflammation was reduced by cupping, bleeding, and other corresponding measures, but a partial opacity of the crystalline

[*] "In seven cases of eruption, attended with iritis, which have occurred to my observation, the disease has been cured without the use of mercury."—Dr. THOMSON in the *Edin. Med. and Surg. Journal*, vol. xiv. p. 91.

capsule in the centre of the pupil, with imperfection of sight remained.

During the time that I was surgeon to the London Ophthalmic Infirmary, I frequently saw patients who had been treated by common means, and in whom general disorganization of the iris, contracted, closed or partially adherent pupil, obstruction of that aperture by adventitious organizations, and loss or serious injury of sight, had resulted from inflammations that might have been checked by mercury, without leaving any permanent ill consequence. I may observe that iritis, of whatever kind, is an affection easily managed: that it rarely fails to yield to proper treatment, even when the case has been originally neglected; and that the serious effects just detailed are chargeable to injudicious management only. A strong contrast to such cases is afforded by those, in which mercury is properly administered; the cure in the latter being rapid and complete, and the occurrence of ptyalism being in general attended with the most decided improvement in all the symptoms. In this latter respect the action of mercury exerts a much more marked influence over the complaint than the loss of blood. In numerous instances, which have come under my observation, the continued progress of the inflammation until the system was brought under the influence of mercury, the immediate cessation of the pain and the corresponding diminution of all the other symptoms as soon as the mercurial influence was established, have afforded the most unequivocal proof of the great power which the remedy possesses over the complaint.

In comparing the progress, effects, and treatment of iritis with those of other inflammations, our attention is chiefly directed to the effusion which takes place from the inflamed texture, to its influence on the pupil, and to the paramount importance of stopping that effusion, and producing the absorption of the newly deposited substance. A very small quantity of lymph thrown out in the pupil, and then organized, may impair or destroy sight. A similar occurrence in any other part would be of no consequence. Effusions take place into the serous cavities, leading to the formation of adventitious membranes, or unnatural adhesions, without any subsequent injurious influence on the functions of the parts. Interstitial deposition occurs in other organs with similar results.

The good effects of the mercurial treatment appear most obvious when it has been resorted to after the failure of other measures. I have seen it rapidly effectual in many cases after active antiphlogistic means had been employed without success. I was consulted, in the year 1822, by a gentleman labouring under iritis, who had undergone considerable depletion during three weeks. He had been bled twice, freely leeched and purged, and kept on low diet, the use of mercury having been carefully avoided under the notion that his constitution, which was supposed to be scrofulous, would not bear it. He had become very pallid and feeble, without experiencing any amendment of the local complaint. The sight, on the contrary, had grown more and more dim. There was a red zone round the cornea, which was hazy; the iris was discoloured and dull; the pupil adhered above and below, so as to have the shape of an hour-glass placed horizontally, and vision was so dim that no print could be distinguished. Under the use of the hydrarg. c. creta and belladonna, with a more generous diet and wine, the disease was speedily stopped; the adhesions gave way, so that the natural figure of the pupil was restored, with perfect vision.

Two opposite opinions are entertained respecting the comparative efficacy and advantages of the simple antiphlogistic, and the mercurial treatment of iritis. Some, placing unlimited confidence in the powers of mercury, assert "that the mercurial action *alone*, when properly kept up, is sufficient to subdue the ophthalmia iridis in its most acute stage;"* while others, dreading the injurious effects of the remedy on the constitution, discard it entirely in these cases, believing that other antiphlogistic means are capable of accomplishing all that is required. I cannot adopt either of these views. Although mercury alone, or, at least, in conjunction with purgatives and restricted diet, will often cure iritis, I have seen many instances in which the sufferings of the patient have been protracted, and the organ has experienced serious injury from the continued progress of the inflammation, when the use of mercury has not been preceded or accompanied by the loss of blood. A striking example of this kind is related in my *Treatise on the Venereal Diseases of the Eye*,† which contains many other cases of acute iritis greatly relieved in their most urgent symptoms by active depletion. The danger of trusting to the antiphlogistic treatment alone has been already sufficiently explained. The practical conclusion, therefore, at which I have arrived after ample experience of the complaint, under every variety of treatment, is, that iritis generally, and the syphilitic form of the complaint particularly, will be most advantageously treated by the successive or combined employment of antiphlogistic means and mercury; that this plan will give the quickest relief, will most effectually arrest the inflammation, restoring the iris to its healthy structure and functions, and will afford the best security against the return of the disease.

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* Dr. Farre, in his Prefatory Observations to the posthumous work of Mr. Saunders; 2nd edition, p. 38.

† Page 208.

Mercury is used with the greatest effect in the active period of the inflammation, and in the acute form of the complaint. It is important to determine the time, after which it can no longer be administered with benefit; but this is a difficult point. The question of practical importance is, whether there is any advantage in using it after the active period of the inflammation is passed? In many such cases I have seen it given with great benefit to vision: I speak of instances in which pain, redness, and every indication of inflammation had disappeared, where the iris had regained its natural characters, and the apparently permanent effects of inflammation had been produced, such as organized adhesions, and considerable imperfection of sight. In many such instances, where several weeks had elapsed from the supposed recovery of the organ, and where the remedy had been used almost without expectation of advantage, it has nevertheless been of service, and has essentially improved vision. In such cases, therefore, it is best to make trial of this powerful remedy. As the circumstances are not urgent, the mercurial influence may be slowly produced; but it will be necessary to keep up the effect for some weeks.

The local employment of mercury has been recommended in addition to its internal use. A weak solution of the oxymuriate has been used as a lotion; and the red precipitate ointment, also in a mild form, has been introduced between the lids. Such local stimuli are obviously inadmissible in the active stage of the inflammation; and I believe that they are of no use as mercurials, at any period. One mode of using the remedy locally is often of much service. When patients complain of severe pain over the orbit at night, the mercurial ointment combined with opium may be rubbed on the neighbouring integuments of the forehead and temple, with great alleviation of suffering. Eight or ten grains of the ointment, with two grains of finely powdered opium, should be well rubbed in before the time at which the nocturnal pain is expected to recur. A larger proportion of both ingredients is sometimes used.* By this mode of proceeding, for which we are indebted to the Germans, the attack of pain will generally be prevented. The benefit, however, is confined to the relief of this particular symptom: mercurial frictions on the brow do not arrest the inflammation as the internal use of the remedy does.

Belladonna.—The artificial dilatation of the pupil must be combined with the use of mercury in order to prevent that contraction to which there is so strong a tendency in iritis. Belladonna and the other narcotics do not exert their power when the iris is highly inflamed, and the disease not yet checked. The application, however, although it may fail to produce the desired effect, does no harm, especially if it be confined to the surrounding skin, and not actually dropped into the eye: perhaps it may even be advantageous by preventing further contraction.

The use of belladonna is of great importance, not only in preventing further diminution of the pupil, but because the contraction of the iris, under its powerful influence, is capable, where adhesions have already taken place, if the effusion be recent, of elongating them, and sometimes of separating them entirely, so as completely to liberate the pupillary margin. But the belladonna cannot do this alone: two conditions are necessary to the accomplishment of the object; the case must be recent, and with the employment of the belladonna we must produce as quickly as possible a full mercurial effect on the system. Under these circumstances, I have seen the whole edge of the pupil detached from the capsule of the lens, to which it had become adherent; and, in proof that adhesions had previously existed, the capsule has exhibited a circular arrangement of black spots, marking their number and situation. These marks, of which the dark colour, like that of the adhesions, is derived from the pigment of the uvea, are permanent, so far as my observation goes.

Adhesions of the pupil prevent its dilatation more or less completely, according to their number and nature. A general and close attachment precludes all change in the dimensions of the aperture, but partial adhesions only affect that part of the iris in which they are situated, so that when the edge of the iris is fixed only at certain points, the pupil may be dilated in the intervals, and then has a more or less irregular shape. A close adhesion prevents all contraction in the corresponding part of the iris; but, when the preternatural connexion is formed by slender threads, the iris may still move in a limited degree. Belladonna and the other narcotics are capable of dilating the pupil in many instances, where the iris is no longer affected by variations in the quantity of light. But the permanent condensation of this delicate texture by the effusion of lymph under violent inflammation, when allowed to proceed uncontrolled, renders it altogether incapable of motion; consequently, in such cases, the narcotics have no effect on the pupil.

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* JUENGKEN mentions 20 to 30 gr. of the ointment, with 10 to 15 gr. of opium for each friction.—*Handbuch*, p. 272.

Operation of mercury.—We know so little of the mode in which medicines produce their effects generally, that it need not surprise us if we should be unable to explain satisfactorily the beneficial operation of mercury in the treatment of iritis. Its influence is not confined to the syphilitic form of the disease, but extends equally to the idiopathic. Although the general opinion is well-founded that the full effect of the remedy is less advantageous in the iritis of rheumatic and gouty persons, I have often found it necessary to use it freely in such cases, more particularly those of the rheumatic kind, and have so employed it with decided benefit, while its more moderate employment in alterative doses is generally resorted to with advantage in all arthritic cases.

The subject receives no elucidation from what we know of the effect of mercury in syphilis. Indeed, the latter is quite as obscure as its influence in iritis. After it has been used for three centuries with a confidence in its specific powers almost complete and general, we now find its efficacy doubted by many, while others ascribe several of the symptoms called syphilitic to the noxious influence of the remedy. Putting these doubts, however, out of the question, and supposing the ancient faith and doctrines to remain unshaken, what information do we gain when we are told that mercury cures syphilis by its specific power; or that mercury causes an action or a disturbance in the constitution which destroys the action of the morbific poison?

The case of iritis is particularly favourable for studying the influence of mercury, because the transparency of the cornea enables us to see what is going on in the diseased structure. We can observe the alterations caused by disease, and the changes effected by our treatment. In this way we discover that mercury, when employed in the manner already described, puts a stop to that increased action of the capillary vessels, on which the effusion of lymph depends. A circumstance so striking could not fail to attract notice as soon as the diseases of the eye were closely observed; thus we find **Beer** strongly recommending the employment of mercury in internal inflammations of the eye expressly on this ground. "I know," says he, "no remedy so capable of preventing hypopyum and opacity of the parts essential to vision, in genuine acute ophthalmia, as mercury."* Again, in the second volume of the same work, he observes, "that no remedy is so efficacious as mercury in the most acute inflammation, and in preventing suppuration and the exudation of lymph, proper evacuations of blood being premised. I promote its excellent effects in obstinate cases, by mercurial friction on the superciliary region; and since employing this method, I meet, even in the acutest cases, with no suppuration, nor with cataracts from lymphatic exudation."†

The late Mr. **Saunders** employed mercury in syphilitic iritis only, as an anti-venereal remedy. In his Essay "*on Inflammation of the Iris, and the Influence of Belladonna to prevent the consequent Obliteration of the Pupil,*" he says, "But this state of the iris (inflammation, with effusion of lymph) sometimes arises from syphilis. Then the general plan of treatment here proposed (the antiphlogistic) must be changed for the specific remedy, and mercury must be vigorously exhibited if it be proposed to obviate the effect of inflammation, which is the same whether the inflammation be general or specific." ‡ His friend and colleague, Dr. **Farre**, was led, from observing the influence of the remedy in syphilitic iritis, to employ it in other forms of the disease; and his observation of its great power in arresting inflammations of this texture, led him to ascribe to it a general property of controlling increased action of the capillary vessels. In the observations prefixed to the second edition of Mr. **Saunders**'s posthumous work, he says, "The certainty with which the mercurial action arrested the deposition of coagulable lymph in syphilitic inflammation of the iris led the editor to give this remedy a fair trial in simple inflammation of the iris, in which the disorganizing process by the adhesive inflammation is precisely the same, however it may differ from the former in its exciting cause. The result of the trial has perfectly satisfied him that the mercurial action *alone*, when properly kept up, is sufficient to subdue the ophthalmia iridis in its most acute stage. Although the full action of mercury is often efficient in arresting that disorganization of the various parts of the body which results from the gradual deposition of coagulable lymph within their interstitial textures; yet the free abstraction of blood is still essential to prevent its bolder and more immediately destructive effusions in phlegmonous inflammation. It is, however, too low an estimate of the operation of mercury to consider it only as a specific against syphilis, or as an evacuant and promoter of certain secretions and excretions,—it powerfully alters the action of inflamed arteries, more especially in respect to the effusion of coagulable lymph, which it, in various degrees, controuls, or even altogether suspends."[*]

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* *Bibliotheca Ophthalmica*; Vienna, 1799, t. i. p. 55.

† *Lib. cit.* t. ii. p. 85.

‡ *A Treatise on some Practical Points, &c.* 2nd ed. p. 66.

Masses of lymph quickly disappear from the surface of the iris, and the interstitial deposition into its texture is speedily removed under the mercurial action. Hence mercury has been supposed to possess the power of causing absorption. I rather think that it has no such direct operation, and that the removal of these depositions takes place in consequence of the inflammation, to which they owe their origin, being arrested. Thus the effused lymph was immediately absorbed, as soon as the inflammation had been stopped, in the case related at page 304, although the mercurial treatment was not adopted. I never saw it disappear more quickly under any circumstances. In the same way tumefaction from interstitial effusion, whether in the cellular membrane or in any organ, is soon dispersed, when the increased action which produced it is subdued, although no mercury may have been employed. Again, fragments of cataract, effused blood, and pus are rapidly removed from the anterior chamber without any use of mercury.[†]

Oil of turpentine.—MR. HUGH CARMICHAEL, of Dublin, has lately recommended the oil of turpentine in iritis generally, and more particularly in the syphilitic form of the affection.[‡] He appears to place the greatest confidence in the efficacy of mercury, speaking of "its almost unerring powers over the inflammation of the iris,"* and admitting "that in the treatment of disease generally, an instance wherein a remedy is more successfully employed cannot perhaps be adduced:"† but he recommends the turpentine in instances where mercury is inadmissible, in consequence of its occasional injurious influence, or of the debility produced by protracted disease. The following extract will show the mode in which the treatment was conducted.

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[*] See the work last quoted; Preface, pp. 38 and 39.

[†] For further observations on the use of mercury in other affections, see my *Treatise* before quoted, pp. 198—203.

[‡] *Observations on the Efficacy of Turpentine in the Venereal and other deep-seated Inflammations of the Eye, with some Remarks on the Influence of that medicine on the System, accompanied by Cases*; 8vo. Dublin, 1829.

"I use the turpentine in this complaint in drachm doses, given three times a-day. Its disagreeable flavour and nauseating effects I have found best obviated by almond emulsion. This circumstance it is very necessary to attend to, the medicine being so unpleasant, that, if its taste be not in some way disguised, it is difficult to depend on patients taking it with the necessary regularity. In the formation of the emulsion, if double the quantity of confection directed in the London Pharmacopœia be employed, that is, two ounces to the half pint of water, it answers the above objects much better: the residuum may be removed by straining.

"With an emulsion so made, the following is the formula I now generally adopt:—℞. Olei terebinth. rectificat. ℥ i. Vitellum unius ovi. Tere simul et adde gradatim, Emulsionis amygdalarum ℥ iv. Syrupi corticis aurantii ℥ ii. Spiritus lavandulæ compositi ʒ iv. Olei cinnamomi guttas tres vel quatuor. Misce, sumat cochlearia larga duo ter de die.

"In a few cases it has been necessary to increase the quantity of turpentine to an ounce and a half,or two ounces, in the above mixture, the other ingredients being proportionally diminished, so that a drachm and a half or two drachms of it may be taken each time; but in general, when administered to the extent directed in this formula, it has very seldom indeed failed, though extensively tried, and in very urgent cases: the instances of its failure shall be presently noticed.

"The strangury, so frequently induced by the internal use of turpentine, is obviated by the usual means—flax-seed tea and camphor julep: when very urgent, the medicine may be suspended for a time. The tendency to acidity in the stomach, which it sometimes causes, is relieved by the addition of carbonate of soda to the mixture; ten or fifteen grains to the eight ounces will be sufficient; some patients have said, the taste was further disguised by this addition.

"When the local inflammation is high, and acute pain is present in the eye and side of the head, the abstraction of blood from the temple, by cupping, or the more immediate seat of the disease, by leeching, may be resorted to: the same practice is adopted where mercury is used. Nevertheless I have frequently, when these symptoms were very urgent, relied solely on the turpentine mixture, and with the most decided and expeditious relief; indeed, in some instances, where the pain and hemicranium existed as acutely as they are, perhaps, at any time to be met with, patients have declared they were considerably relieved after they had taken it once or twice, and that its subsequent exacerbations were lessened in a very remarkable degree. It is in the former cases I have generally found it necessary to follow up the bleeding by increasing the quantity of the turpentine.

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* Page 25.

† Page 26.

"It is highly necessary to observe, that the condition of the bowels will require attention: the beneficial effects of the medicine appear to be in certain cases suspended when constipation is present, and are called forth, as it were, when this is removed."*

The cases related by MR. CARMICHAEL exhibit the powers of the remedy in a very favourable light. In several well marked instances of syphilitic iritis, the pain, redness, and other symptoms were quickly removed, effused lymph was soon absorbed, and vision restored under its influence. In other instances it was less successful.

As the result of some trials of the remedy by MR. GUTHRIE, it is reported, that "in some cases it has succeeded admirably; in others it has been of little service; and in some unequal to the cure of the complaint."†

I have had no experience of this remedy in iritis.

SECTION II.—ACUTE AND CHRONIC IRITIS.

The disease, which I have now described generally, is not an uniform affection, always pursuing a certain course, and marked by the same symptoms; we recognize distinct forms of the complaint, with important differences in the phenomena and treatment.

Acute and chronic iritis.—The cases differ much in the severity of the symptoms, in the rapidity of progress, and in the entire duration. Serious mischief may occur in a few days; or weeks may elapse without permanent change of structure or injury of sight. Hence the distinction of *acute* and *chronic iritis ;* or the three-fold division adopted by some writers, of *acute*, *subacute* and *chronic*. There are indeed numerous gradations; but in this, as in other cases, it is sufficient to mark the difference of character generally: we cannot attempt to give a name to each degree.

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* Page 9—11.

† *London Medical Gazette*, vol. iv. p. 509.

The acute form of the disease (*iritis acuta*) is seen in robust persons of full habit, where a powerful cause has acted on the organ; more especially if the case has been neglected at the commencement, or the cause has continued to act. Here we shall find bright external redness, great distension of vessels, rapid and general change of colour in the iris, contraction of the pupil, effusion into its aperture, dulness of the cornea, loss of sight, agonizing pain of the eye, severe head-ache, considerable fever, with want of sleep and restlessness. In a few days vision is irreparably destroyed. In one case, at the end of four or five days, the natural colour of the iris was completely lost, the pupil filled with lymph, and vision reduced to the mere power of distinguishing light from darkness. In another patient, within a few days, the iris had become so dark and discoloured, that its natural colour could not have been determined; a mass of reddish-brown lymph was deposited on it; the pupil was irregular, contracted, and motionless; and it was doubtful whether the patient could distinguish light and darkness. The blood drawn from the arm in both these cases had a firm buffy coat.

As examples of slower progress *(iritis subacuta)* I may mention a case, in which vision was not seriously impaired at the end of six weeks, although the iris was discoloured, and two masses of lymph were effused; a second, where there was discolouration, but the patient could still make out print after six weeks; and a third, in which the disease had lasted nine weeks, yet tolerable vision was recovered. Another patient had iritis of the left eye in a rather acute form. I observed in the right eye a stratum of light yellowish lymph of loose texture, covering one half of the inner circle of the iris; there was no redness, no pain, nor diminution of sight, and the patient was not conscious that his eye was affected.

The disease sometimes arises so slowly, proceeding to effusion of lymph and its organization into adhesions, to diminution or even loss of sight, that no visible vascular distension occurs, no alteration is observed in the eye, no pain is felt, and the patient even discovers the existence of the disease accidentally: *(iritis chronica* or *lenta.)*

CASE.—A lady of twenty-five, tall, with light hair and irides, who had been in the habit of spending much time in needle-work, had experienced, for some months before she consulted me, dimness of sight in the right eye, which had come on gradually, without pain or redness, except that the eye had been a little bloodshot for a day or two in the very beginning, after which the appearance went off. For the previous six weeks she had been judiciously treated by a physician: venesection, leeches to the temple, aperients, and mercury carried to the length of salivation, had been employed. There were three adhesions of the right pupil, scarcely discernible in its natural state, but rendered obvious by the use of belladonna: all useful vision was lost in this eye. Two adhesions existed in the left eye, and vision was dim. No pain or redness had ever been noticed in this eye. The irides, pupils, and all visible parts of both eyes were perfectly natural in all other respects.

CASE.—A young lady of delicate frame and constitution, of great information and accomplishments, who habitually devoted a large portion of her time to music, reading, drawing, and fine needle-work, found, on looking at a picture with the left eye shut, that she had lost the sight of the right. She had experienced no uneasiness in it; there had been no redness, nor any other change to attract the notice of her friends. A gentleman since dead, who had great reputation in this department of practice, was consulted. He said that the eye had probably been originally defective; and in answer to an inquiry on that subject, he observed that there was no necessity for restriction in the use of the other eye. As this opinion, which accorded with the inclination of the patient, was acted upon, the left eye soon became diseased, and the case was placed under my care. I found inflammation of the left iris, with adhesion of the pupil, slight external redness and some pain. In the right eye, the iris was slightly altered in appearance, and the pupil fringed with slender dark adhesions; the aperture itself was clear, but vision was extinct. A mild antiphlogistic treatment, followed by the use of mercury, restored the sight of the left eye: it was necessary to continue the mercurial course for some weeks, although the patient's friends had in the first instance entertained great apprehensions of the remedy, on account of her delicate constitution and supposed consumptive tendency. A relapse took place at the end of a year, when the employment of mercury was again successful, but not till after it had been used for many weeks. In a third relapse, the patient again used mercury, not so much from the recommendation of her medical advisers as from her own conviction that it was the only means of restoring her sight. She employed it by friction, and persevered for five months before vision was restored. These unusually long and repeated mercurial courses produced none of the anticipated injurious effects on health. Disease returned again, and at last destroyed all useful vision.

Extension of inflammation to the posterior tunics is most to be feared in acute iritis; but, that the chronic form of the disease is not exempt from this danger, is rendered evident by the two foregoing histories.

SECTION III.—SYPHILITIC IRITIS.

Iritis is called *idiopathic*, when it occurs from mechanical injury, or other immediate influence on the part, in persons of healthy constitution. The yellow abscesses already described, and the hypopyon resulting from their bursting, are said to belong particularly to the acute idiopathic disease. The *sympathetic* forms of the affection are those which it assumes in unhealthy states of constitution.

I consider the *syphilitic* to be the most frequent description of iritis: it is indeed very common, and as unequivocal a consequence of syphilitic infection as any other symptom of the disease, although MR. HUNTER[*] and MR. PEARSON[†] were not only unacquainted with it, but have expressly denied the existence of any affection of the eye as dependent on the venereal poison. It is a secondary symptom, taking place in the constitutional stage of the disorder.

Although sometimes occurring alone, it is more commonly accompanied by other secondary symptoms, such as eruptions, ulceration of the throat and mouth, pains of the limbs, and swellings of the periosteum. It is seen in conjunction with papular, scaly, tubercular, and pustular eruptions. As it belongs to the earlier class of secondary syphilitic affections, it sometimes shows itself, like the other symptoms of that class, before the primary disorder is cured.*

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[*] *Treatise on the Venereal Disease*, p. 324.

[†] Letter to Mr. BRIGGS in his translation of SCARPA's *Treatise*, p. 164—166, note.

It is but rarely seen as a symptom of syphilis in infants: numerous children labouring under this disease have come under my observation, but iritis has occurred in two instances only. In one of them, there were excoriations and ulcerations round the anus. The iris had lost its brilliancy, and become dark-coloured; the pupil was slightly contracted, and there was some redness of the sclerotica. On the other case I was consulted by letter from the country. The father had had primary venereal sores before marriage. In a few weeks after birth, the child had an eruption all over the body, wasted, and seemed on the point of dying. It got well under the use of mercury in very small quantities. In a few weeks more, severe inflammation of the eyes came on: mercury was employed in the same manner; the inflammation was arrested, but the child remained blind. I saw it some weeks after. Both pupils were fixed, and moderately contracted. An opaque body, which was not a cataract, was seen behind one; the other was clear. Both eyes were blind.

I have seen one instance in which syphilitic iritis, or rather syphilitic inflammation of the internal tunics, occurred as a secondary symptom, in conjunction with scaly eruption, after the infection of a chap on the hand by the contact of discharge from a sore in delivery.

Syphilitic iritis may be either acute or chronic. It is frequently, but not invariably accompanied with effusions of lymph in masses or tubercles of a reddish or yellowish brown colour.

Beer seems to regard these depositions of lymph as analogous to the condylomatous excrescences which appear on the organs of generation and the neighbouring parts in some venereal cases. I do not see the analogy. "When effective and appropriate treatment is not adopted at this critical period of the disease, other much more important phenomena present themselves, if it be a case of pure genuine syphilitic iritis. On the pupillary, or on the ciliary margin of the iris, or on both, there are formed reddish brown, knotty elevations, which become larger and larger, and appear, on close examination with a glass, very similar in structure to those condylomata, which are called cristæ galli."†

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* The cases related in my *Treatise on Venereal Diseases of the Eye*, illustrate the various points referred to in this paragraph.

† *Lehre*, vol. i. p. 558. The appearances are well represented in tab. ii, fig. 4.

It has been represented by **Beer** and others, that the pupil seems drawn upwards and inwards, or towards the root of the nose: it is displaced in this direction sometimes, but not constantly. Its form and situation depend on the effusions of lymph.

The pain is chiefly nocturnal: the patient may have hardly any uneasiness during the day, even although the attack be acute, and the external redness considerable; but, as evening comes on, or soon after bed-time, the pain, which is usually seated in the brow, begins, and arrives at such a pitch as to prevent rest, going off again completely towards morning. Where pain exists constantly, there is a marked exacerbation at night.

I have not seen the appearances described by **Beer** in the following sentence: "Lardaceous (speckige) ulcers frequently appear at the same time both on the cornea and on the white of the eye; while gummata, or true tophi, which quickly pass into the state of ulceration, form on the edge of the orbit, particularly in the neighbourhood of the frontal sinus and at the root of the nose."*

Diagnosis.—The tubercular depositions of lymph, the reddish brown discolouration of the iris on its inner circle, the nocturnal exacerbations of pain, which is felt either in a much slighter degree or not at all during the day, the angular disfiguration of the pupil, and its occasional displacement towards the root of the nose, together with the previous occurrence of syphilis, and, in most instances, the concomitant existence of other syphilitic symptoms, clearly designate this kind of iritis and distinguish it from other forms of the affection. The local symptoms alone are not sufficient, in all cases, to establish the distinction; for we sometimes see merely a general discolouration of the part, such as might occur in idiopathic or arthritic iritis. In one patient the complaint exhibited all the characters of the latter affection, including the white ring between the red zone and the margin of the cornea; and the state of the iris was similar in another. Under such doubtful appearances, the age of the patient, with the previous and concomitant circumstances, will not fail to elucidate the nature of the affection. In idiopathic iritis there is no distinct deposition, or it occurs as a yellow abscess, with the addition of hypopyon if the abscess breaks. Such yellow abscesses are very seldom seen in syphilitic iritis. Lymph is effused from the margin of the pupil in the arthritic species, but not deposited in a distinct form, and the adhesions are generally white. Both in the idiopathic and arthritic iritis the pupil generally retains its circular figure and central position in the iris.

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* *Lehre*, vol. i. § 580.

Although the effusion of reddish, brownish, or brownish-yellow lymph on the iris, in the adult, clearly shows the case to be venereal, I have seen analogous appearances in several instances, both of young children and infants, in whom no suspicion of syphilis could be entertained.

The treatment falls under the general rules already laid down.

SECTION IV.—ARTHRITIC IRITIS.

Inflammation of the iris is a common affection in the rheumatic and the gouty. The circumstances characterising it are, in addition to some local peculiarities, the temperament of the individual, and the previous occurrence, or present existence, of rheumatism or gout.

In describing gonorrhœal inflammation of the external proper tunics of the eye, and rheumatic ophthalmia, I have mentioned that the inflammation occasionally extends to the iris. Rheumatic iritis thus produced is not a serious affection.

The following is an example of simple rheumatic iritis.

CASE.—A man, forty-one years of age, who has been subject to occasional pains of the limbs from exposure to cold in his occupation, that of a waterman and fireman, but otherwise healthy, became my patient on the 14th of July, 1831, for an inflammation of the right eye, which had existed three days. The symptoms were external redness, chiefly in the sclerotica, and in the form of a zone round the cornea; dulness of the iris; pupil rather contracted and irregular; dimness of vision; intolerance of light and pain shooting across the head. Cupping, leeching, blister, Plummer's pill and colchicum were tried in succession, without much benefit. On the 3rd of August the sulphate of quinine was given; two grains three times a day, and the emetic tartar ointment was rubbed on the back of the neck. The symptoms rapidly subsided, and he was discharged on the 7th. No effect of the complaint remained except a slender adhesion or two of the pupil. He was re-admitted on the 15th with a similar attack in the left eye. The quinine and the tartar emetic ointment were now immediately resorted to, but without advantage. The vinum colchici was then administered in the dose of half a dram every six hours with some advantage. Cupping, leeching, and blister were employed. He then took a dram of the vinum colchici every six hours, under which the symptoms quickly yielded, and he was quite well on the 7th of September.

In persons of gouty habit inflammation often attacks the iris, and is usually of an acute character. Uneasy sensations are experienced in the neighbourhood of the eye; pains occur about the forehead, brow, and orbit, extending to the side of the head. Redness of the sclerotica comes on with pain of the eye, intolerance of light and lacrymation. It has been observed by the Germans, that in consequence of the repeated motions of the lids, which become red and a little swelled, a small quantity of white froth or foam collects on their edges, particularly towards the angles. With increase of the local symptoms, the iris is now obviously involved; it becomes dull and discoloured, the pupil is contracted, but preserves its central situation, and it is fixed at one or more points to the capsule. The complaint is attended with headache and feverish disturbance of the system.

The red zone round the cornea does not advance to the very edge of the latter; but a narrow white ring is left between them. This white border is often partial, being observed more especially towards the angles of the eye. It has been remarked by the Germans, that the colour of the zone in arthritic iritis is more dull than in the other forms of the affection, that it is sometimes even livid, and that the vessels occasionally exhibit a kind of varicous enlargement. After a violent attack of this kind, with great diminution of sight, the symptoms subside, the eye recovers, and vision is completely restored, the iris being connected to the capsule by adhesions of white colour. The inflammation returns again and again, and we are surprised to see the eyes recovering so completely as they do after these repeated attacks.

A gentleman whom I saw labouring under severe arthritic iritis, told me that his eyes had been inflamed fourteen times, yet vision was unimpaired, though there were in each eye adhesions connecting nearly the whole pupillary border to the capsule. In each attack fresh effusion takes place; the pupil is more and more contracted, and at last filled entirely with an opaque adventitious membrane. Even now, although sight is destroyed, the texture of the iris is in many cases but little altered. Sometimes one violent attack closes the pupil, or greatly contracts and fills it with a densely opaque plug. Sometimes gouty inflammation, when severe and long continued, causes complete disorganization with puckering and tubercular projection of the iris and extinction of sight.

When this violent local inflammation occurs, as it frequently does, in persons of plethoric habit and robust constitution, abstraction of blood by venesection and cupping, and other suitable antiphlogistic measures are urgently necessary. In older persons, whose powers are reduced by frequent gouty attacks, if there is active local mischief, with heat of head, white tongue and thirst, and full pulse, the indication for depletion is still obvious. The antiarthritic remedies, as they are called, which are either stimulant or narcotic, can only add to the mischief This remark, however, does not apply to colchicum, which may be employed alone, or in combination with purgatives.

I believe that arthritic iritis neither requires nor admits that free use of mercury, which is so advantageous in other forms of the complaint. I have seen cases in which mercury, carried to salivation, has been injurious rather than beneficial. Calomel is useful as a purgative, particularly in combination with antimony; and, after the bowels have been evacuated, mercury may be given in the alterative form, such as Plummer's pill once or twice a day, with mild aperients. Sometimes we are obliged to use the remedy more freely, and we do it with advantage. Abstinence from all stimuli in diet, and attention to the state of the bowels, are points of obvious necessity. Counter irritation by blister, or preferably by the tartar emetic ointment, may be employed with advantage after depletion. Tepid fomentations are the best local means. The Germans recommend dry warmth, and opiate frictions to the forehead, using for the latter purpose opium moistened with saliva or mucilage.

Since repeated attacks of arthritic iritis must either seriously injure or destroy sight, it is of importance to adopt preventive measures; to enforce such regulations of diet and mode of living as will remove that plethoric state of the system which exposes it to the attacks of gout.

I subjoin two cases to illustrate the nature of the affection.

CASE.—In the summer of 1829, I saw a gentleman, forty years of age, of sanguine temperament, and stout frame. He led a dissipated life at Oxford, where he drank port wine very freely. At the age of twenty-two he had a severe attack of gout, that is, painful affection of the feet, knees, and other parts, which lasted several months. This induced him to leave off port; but, having an excellent appetite, he has been accustomed to eat largely, and to drink beer and other liquors. Since his arthritic affection he has had ten attacks of inflammation in the right eye, and the left suffered on two occasions. At one time he had no inflammation of the eyes for three years; and in that time he had swelling, with some pain of the right hand. With this exception, he has not suffered in the joints or limbs since his first illness. The iris of the right eye is of a dull, leaden colour, irregularly tuberculated on its surface, and in contact with the cornea, except at its central portion, where the pupillary margin, being adherent to the capsule, seems depressed. The globe is hard to the feel, and vision is extinct. About one-half of the circumference of the left pupil is connected to the capsule by white adhesion. Vision is perfect. From this gentleman's description, the various attacks of the eye seem to have been highly inflammatory. For some time after the last inflammation of the right eye he felt a flow of blood to the head, and uneasiness of the eye after every meal.

Case.—A gentleman, fifty-two years of age, of spare habit, has nearly lost the sight of both eyes by arthritic iritis. He has been subject to rheumatism all his life. His father was gouty, had chalk stones, and died of gout in the stomach. A brother lost his sight from repeated attacks of iritis; and a sister is rheumatic. The eyes of this gentleman have been inflamed about a dozen times, each return having been preceded and accompanied by rheumatic ailments. He had repeated inflammation of both eyes, from September 1827, to September 1828, with rheumatism all over the body. The iris of the left eye is bulged, tuberculated, and thoroughly discoloured; the vessels are varicous, and sight is destroyed. In the right the iris is convex, and nearly in contact with the cornea, the pupil is fixed by a white adhesion, and enough sight remains to enable him to find his way about. This gentleman had an attack in the right eye recently; the local and general symptoms were inflammatory; three cuppings on the temple, to eighteen, sixteen, and fourteen ounces were necessary.

Scrofulous iritis.—The inflammation which begins externally, under the usual character of strumous ophthalmia, sometimes extends to the iris, and to the more deeply seated parts of the globe. It is preceded and accompanied by change of structure in the cornea, which prevents us from observing what is going on in the anterior chamber, so that the very existence of the iritis is often not known, until it has gone through its course and come to an end. I have not seen scrofulous iritis as a primary affection. The presence of this complication does not require any departure from the principles of treatment applicable to strumous ophthalmia generally.

CHAPTER XVIII.

INFLAMMATION OF THE RETINA, AND OF THE INTERNAL TUNICS GENERALLY.

SECTION I.—RETINITIS.

We have seen that inflammation commencing in the iris will extend to the other internal parts, and that thus it may ultimately affect the whole organ. The posterior tunics may be primarily inflamed. The disease probably commences most frequently in the retina; and may therefore be designated in its early stage, and when it is confined to its original seat by proper treatment, by the term *retinitis.* The retina may, perhaps, be not much less liable to inflammation than the iris, but we are less acquainted with the phenomena, because the part affected is out of sight, and the disease does not terminate fatally. We often meet with cases in which there can be no doubt that inflammation of the retina is the cause of the symptoms. Pain and impaired vision are its leading circumstances; the pupil is at first contracted, then enlarged.

Rosas* says, that the affection does not usually extend over the whole retina, but that it is found, on examination after death, to be confined to the neighbourhood of the yellow spot. He says, that under favourable circumstances it often leaves behind a temporary or permanent weakness of sight, while in worse cases it leads to amaurotic blindness, from effusions of lymph, varicous change of structure, or even ossification of the retina, and adhesions of it to the neighbouring parts. I have often seen it entirely removed by active treatment in the early stage, without any permanent injury to vision. The nature and treatment will be best illustrated by a few cases.

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* *Handbuch*, vol. ii. § 780.

Case.—A young woman, of florid complexion and full habit, came to the London Ophthalmic Infirmary, complaining that she had lost the sight of one eye. She was cook in a family, and occupied for several hours daily before large fires, supporting her strength by free living. The pupil was slightly dilated, the iris motionless; a faint and scarcely perceptible pink tint was observed in the sclerotica near the cornea. Vision was dim, and had been so for three days. There was headache, flushed countenance, heat of skin, whitish tongue, and thirst. I considered the case to be pure retinitis, and to afford a favourable opportunity for showing whether the affection could be arrested by antiphlogistic treatment. At that time, (now many years ago,) I did not possess the knowledge of the powers of mercury in inflammation of the retina, which subsequent experience has given me. I directed a full bleeding from the arm, free purging, low diet, repose of the organ, and general rest. At the end of two days the sight was worse; cupping and blister were now ordered, but there was no improvement at the end of two days more. I now determined on trying mercury, and ordered two grains of calomel every four hours. Before the remedy had affected the system, vision was quite lost; or at least reduced to the mere power of distinguishing light from darkness. Full salivation, which took place in about a week from the first application of this patient at the Infirmary, suspended all the symptoms; sight immediately improved, and was soon completely restored.

Case.—A young woman, twenty-four years of age, came under my care in the spring of 1831. She was a cook, and employed much before fires; she ate meat twice a day, took two pints of ale daily, and sometimes gin and water. She had lately experienced headache, and now complained of dimness of sight, for which she had been bled and purged. The iris was slightly and partially discoloured, and its pupillary margin adhered at two points to the capsule. The pupil was clear, sight was dim, so that she could not read. There was pain over the brow, and no external redness. I ordered abstraction of blood from the temple by cupping; two grains of calomel, with one-third of a grain of opium every eight hours. The mouth soon became sore, and vision improved. Plummer's pill night and morning was now substituted for the calomel and opium, so as to keep up a certain influence on the system. In three weeks the patient was able to return to her situation with perfect vision.

Case.—A young man of irritable habit, standing at a door under a lamp-iron, during a thunder-storm, on the 2nd of August, 1832, was struck by lightning, fell backwards, and was convulsed for some minutes. He said that the lightning appeared to enter his eye with a scorching sensation. Mr. Wheble, of Waltham Abbey, who saw him, and had charge of the case, bled him from the arm with great relief. Another flash of lightning produced a slighter attack; but the sight returned. During the night vision was completely lost. On Friday morning there was no redness, nor any unusual appearance of the eye; the iris was motionless, and the patient could not even see the sun. He could, however, open the lids, and move the eye. A blister was applied to the back of the neck, and three gr. of calomel, with some Dover's powder, were given night and morning; in two days, the calomel was given every four hours. The lids became spasmodically closed, and the patient could neither open them nor move the eye. On Thursday, the 9th of August, he suddenly jumped up from a sofa on which he had been sleeping, with a most violent pain, similar to that of the first attack. This lasted about five minutes. Similar paroxysms occurred every five or ten minutes for two hours, when he suddenly opened the eye, and saw light. Most intense pain, similar to that experienced at the time of the accident, now came on, and he writhed in agony. Light was intolerable, even though the eyes were carefully covered. The pain went off in the night, and sight returned. It has gradually improved, but is still (August 28) very weak, so that he cannot use the eyes at all, without the protection of blue glasses.

Case.—Eliza Radley, sixteen years of age, with light hair and eyes, was admitted into St. Bartholomew's under my care, on the 1st of August, 1826. The left eye is kept half closed, but she can raise the upper lid. When brought to the window for examination of the complaint, she closes both eyes, apparently experiencing a painful impression from the light. The retina of the left eye is totally insensible, so that she could not distinguish the situation of the window when brought near it. There is slight redness of the sclerotica. The pupil, like that of the other eye, is rather contracted, but the irides move naturally. There is considerable pain in the head, and a dull expression of countenance. Opening medicine has been taken, and the tongue is clean. She first noticed the defect of sight four days ago, when it was attended with headache: both symptoms have increased to the present time. The sight was previously good. (Sixteen ounces of blood by cupping from the back of the neck.) 2nd. Opening medicine; afterwards 2 gr. of calomel, with one-third of a grain of opium every six hours. 4th. Sight was improved yesterday, and is now restored: (continue the medicine.) 8th. The calomel and opium were left off yesterday; the mouth had not been affected. She is discharged quite well, the left eye opening freely, and the countenance much improved.

CASE.—George Winston, aged twenty-seven, a carman, and accustomed to drink freely, went to bed well on the 29th of July, 1826. Towards three in the morning he felt great pain in the right eye, and he found himself blind with that eye when he got up on the 30th. When he came to St. Bartholomew's Hospital on the 1st of August, there was slight redness of the sclerotica; the size and motions of the pupil were nearly as in the other eye. The access of light was painful, and he could not read large print. There was head-ache; pulse 84 and soft; bowels confined. (Venesection and opening medicine immediately; then calomel and opium every six hours.) 2nd. Thirty ounces of blood were taken, when fainting ensued. Sight much improved; pulse more full and strong; (cupping to 16 oz.) Aug. 4. Mouth sore, and sight perfectly recovered. In three or four days more he left the hospital.

The following case, which was completely relieved by antiphlogistic treatment, is interesting, because the appearances of constitutional debility, combined with the failure of power in the retina, would have been generally regarded as indicating the propriety of tonics and stimulants.

CASE.—M. Gibbs, twenty-three years of age, tall, with pallid countenance, and the appearance of general feebleness, found the sight of the left eye become dim, after complete confinement within doors, and close attention to needle-work. The occurrence was preceded by dizziness, and attended by head-ache, and severe pain in and around the orbit. Leeches were applied a few times, to the amount of eighteen, and a blister behind the ear; she was also put under a gentle mercurial course till her mouth became rather sore. She continued to use the eye, which grew worse, and the vision of the right began also to suffer. She therefore came under my care at St. Bartholomew's on the 26th of August, 1830. At this time there were a few red vessels in the sclerotica of the left eye, giving it a pink hue. The pupil was of the same size as in the other eye, and the iris acted feebly. She could barely distinguish light from darkness. There was frequent headache, with deep-seated pain in the orbit, especially at night. The right eye was dim, so that she could not read small print. She has not menstruated for the last two months, and has been quite irregular since the eye was first affected, now four months. (Cupping behind the ears to 12 oz. Pil. hydrarg. g. v. manè et vesperè quotidie.) 31st. Less headache and pain; vision not improved. (Pil. ferri c. myrrha g. x. omni nocte.) September 1. Cupping on the temples to 12 oz. 5th. Vision of the right eye nearly perfect, that of the left improved; the redness of the sclerotica has disappeared. (A blister between the shoulders, to be dressed with savine cerate.) On the 11th, she was attacked with partial inflammation of the left pleura, which required leeching, cupping, and antimonial medicines. 20th. The pleuritic attack has subsided, and the pain of the side has disappeared: she is considerably reduced by the treatment. The headache and orbital pain are gone, and the vision of the left eye is perfect, so that she reads the smallest print with facility.

SECTION II.—INFLAMMATION OF THE INTERNAL TUNICS.

Internal ophthalmia. Ophthalmitis interna idiopathica, BEER.
Ophthalmitis posterior totalis, ROSAS.

Analogy would lead us to conclude that inflammation might begin in other internal structures of the eye, as well as in the retina; but the point has not yet been clearly ascertained: at all events, I could offer nothing satisfactory in a practical point of view on choroiditis,* hyalitis, capsulitis, and lentitis.†

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* *Some account of inflammation of the choroid coat,* by W. MACKENZIE. *Glasgow Medical Journal,* vol. iii. p. 1.

† These various inflammations are described by MR. MACKENZIE, JUENGKEN, and ROSAS.

Inflammation of the lens and capsule is dwelt on at considerable length by WALTHER, in an essay on "The diseases of the crystalline lens, and the formation of cataract," in his *Abhandlungen aus dem gebiete der praktischen medicin.* Landshut, 1810.

Professor AMMON, of Dresden, has described inflammation of the orbiculus ciliaris. It closely resembles, according to his description, inflammation of the anterior chamber. RUST's *Magazin,* vol. xxx. p. 240.

Pain in the organ and impaired vision are the principal characteristics; there is but little external redness in the early stage, and often there is not much throughout the affection. The pain is deep-seated, of a dull aching kind, with a sense of pressure and tension, and often with a feeling of heat; it increases in intensity, and is aggravated by exposure to light, by using the eye, or by circumstances that excite the circulation, or produce determination towards the head. It extends from the globe to the orbit, and soon spreads to the brow, the occiput, the side of the head, or the head generally. Dimness of sight comes on with the pain, and in severe cases sight is sometimes speedily extinguished. At this period, the external appearances of disease are not considerable; there is a little redness of the sclerotica round the cornea. The pupil may be either contracted, the iris moving quickly, or the latter may be sluggish, and the former rather dilated. The first is the earlier stage, denoting excitement of the retina, while the latter circumstances indicate more advanced affection, with impaired sensibility in the nervous structure.

The patient is feverish; there is heat of skin, thirst, white tongue, disturbed circulation, and restlessness.

With the continuance of the complaint, the inflammatory symptoms are more developed and obvious. The sclerotic redness increases, and forms a bright red zone round the cornea. The iris changes colour and expands, the pupil contracting towards the centre, losing its clear blackness, and becoming filled with a web of lymph, effused from the thickened margin. The sight becomes more and more imperfect, and is soon lost. This happens from the inflammatory excitement and consequent change in the retina; it takes place before the entrance of light is mechanically impeded by the changes in the pupil. After vision is entirely lost, sparks, flashes, and various luminous appearances may still be perceived, and even be troublesome to the patient.

In the second stage, with increased external redness, pain, headache, and fever, the pupil closes, sight having been previously lost. The iris becomes convex, being pushed forwards towards the cornea, so as to diminish or destroy the anterior chamber. Suppuration occurs, matter is effused in front of the iris, constituting hypopyon; blood is sometimes mixed with it. Now the internal and external tunics are fully involved, and the appearances are those of general ophthalmitis.

The results of such an affection are, closed pupil, with the formation of an adventitious membrane, insensibility of the retina from change of structure, consequent on violent inflammation, large suppuration, making its way externally, and leading to collapse of the coats, contraction and partial obstruction of the pupil, with impaired function of the retina, opaque capsule and lens. Resolution may occur, with vision more or less impaired, or with complete recovery of sight.

Prognosis.—When disease attacks the nervous structure, in which vision immediately resides, and the pupillary aperture through which light enters the organ, the case cannot be otherwise than serious, requiring the closest attention, and active treatment. The prospect is favourable in the beginning, and is less and less so, in proportion to the duration. The state of the retina, as indicated by the degree of vision, and the condition of the iris and pupil, are the most important criteria. Greatly impaired vision, produced quickly, with pupil still clear, and not much contracted, may be restored. If sight should have been totally lost, before the pupil has closed; or if that opening be much contracted, and vision gone, there is no hope. The loss of vision is not altogether discouraging in itself, but it is a bad sign when connected with considerable change in the iris and pupil, and great external redness.

The treatment is the same as in iritis; it must be antiphlogistic in the first instance, and this must be followed up by the decided use of mercury, combined with the local employment of belladonna.

It might be expected that the antiphlogistic measures alone would answer the purpose; but this is not the case; they check the disease, they diminish the external redness, the pain and headache, and relieve the patient altogether, but they do not improve the sight much; they do not control that excited state of the capillary circulation, which threatens such dangerous results to vision. Mercury is equally powerful in checking this, when it occurs in the retina, as in the iris, and the object cannot be accomplished without this remedy, nor without its decided action on the system. The beneficial results from the combined action of the antiphlogistic and mercurial plans are often truly surprising. It has so often happened to me to see depletion, even when carried to the largest extent, fail, and vision immediately benefited, and soon restored by the employment of mercury, that on this point I speak with the greatest confidence.

INTERNAL INFLAMMATION OF THE EYE CONSEQUENT ON FEVER.

In the fourteenth volume of the medico-chirurgical transactions, * there is "*An essay on a peculiar inflammatory disease of the eye, and on its mode of treatment*," by Mr. WALLACE, of Dublin, in which he describes what he calls a most obstinate and dangerous form of inflammation of the eye, frequently observed among those who had laboured under fever. He observes that "the complaint in question strongly resembles venereal iritis, not only in the appearance of the diseased organ, but also in the character of the patient's countenance. The eye-lids are half closed, reddish, and swoln; the vascularity of the sclerotic and conjunctiva being greatly increased, with a peculiar dark brick red colour. The iris is altered in colour, generally greenish, and incapable of motion; the pupil contracted, with its edge thickened and irregular. The cornea is dim, with an appearance like that of glass which has been breathed upon. There is often a turbidness of the aqueus humor; and a pearly appearance of the parts behind the iris may be observed by looking through the pupil. There is great intolerance of light, and a copious, hot, lacrymal discharge. The vision will be found, for the most part, so extremely imperfect, that the patient can merely distinguish light from darkness, and he is often tormented by flashes of light which shoot across his eye, and these occur more particularly in dark places; or he is troubled by brilliant spectræ, or by the constant presence of muscæ volitantes. There is very considerable pain, which returns in paroxysms, and these are almost always more severe at night. The pain is sometimes referred to the ball of the eye, sometimes to one of the lids, sometimes to the temple, or the circumference of the orbit. It is, one while, compared to the action of a saw on the bones, and on other occasions, to the darting of a sword through the eye-ball. This disease occurs as frequently in the male as in the female. The youngest patient of whose case I have a note, was ten years of age, and the oldest thirty-six years. It seldom attacks both eyes, and the right eye suffers more frequently than the left. Of forty cases which I have noted, there were only four who had the disease in the left eye, and only two who had it in both. The general health seldom appears to be much deranged. The tongue is for the most part slightly white. There is often considerable thirst, and the pulse is somewhat accelerated. The bowels are frequently confined, and there is occasionally a disposition to nausea. The disease has occurred more generally in those who have been the subjects of relapse, but the period at which it takes place after the first attack of fever is extremely uncertain. In some it has appeared immediately, in others not for months. Sometimes a state of apparently full health has intervened between the attack of fever and the commencement of the inflammatory disease of the eye; on other occasions, the general health has seemed imperfect from the time of the fever, until the occurrence of the ophthalmic affection."

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* Page 286.

Mr. Wallace proceeds to observe that the disease presents two distinct stages, in the first of which there are amaurotic symptoms alone, to which, in the second, those of inflammation are superadded. The period at which the former commence after fever, and the length of time that they exist before external redness comes on, are very uncertain. Sometimes dimness of vision and muscæ volitantes have been experienced at or before the time of convalescence from fever; yet the inflammatory stage has not supervened for weeks or months; while on other occasions, the dimness has not commenced for weeks or months after the febrile attack, and has then been immediately followed by the symptoms of inflammation. The inflammatory also precede the amaurotic symptoms in the time of disappearance.

Mr. Wallace had found the treatment by depletion and mercury insufficient, and even injurious, when he accidentally witnessed the rapid recovery of a case, in which the patient took bark on account of an intermittent under which he laboured at the same time. This led him to employ the same remedy in other cases, which he did with striking, and apparently constant success. At first he did not venture to employ it when the inflammatory symptoms were severe, without previous bleeding and purging. "But latterly," he adds, "whenever a case has presented itself, I have prescribed the bark alone, or simply with such medicines as were suited to the regulation of the bowels, and with the most decidedly good effects. Indeed, I have thought that the abstraction of blood has, on some occasions, considerably retarded the cure; yet cases may occur in which bleeding and purging may be necessary." Mr. Wallace gave the bark in powder, half a dram or a dram three or four times in the twenty-four hours; or the sulphate of quinine in two grain doses. He relates several instances in which this treatment had been employed, both where mercury had been used in vain, and where it had not been resorted to. He employed it equally during the amaurotic stage, and after the inflammatory symptoms had commenced.

At page 95, I have quoted from professor Walther a case of ophthalmia occurring after fever; apparently similar to the affection described by Mr. Wallace: it was successfully treated by loss of blood.

Mr. Hewson* has related five "*cases of ophthalmia succeeding to typhus fever*," in which the symptoms were exactly the same as those described by Mr. Wallace. They all yielded readily to mercurial treatment.

SECTION III.—ARTHRITIC INFLAMMATION OF THE INTERNAL TUNICS.

In arthritic iritis, which has been already described, the disorder begins in, and is chiefly confined to, the iris. But in the gouty, or in persons of that impaired constitution and general health, which are analogous to the arthritic state, a more extensive inflammation is frequently developed, affecting the internal parts of the globe generally, that is, the choroid, iris, retina, vitreus humor, lens and its capsule, and involving the sclerotica and cornea secondarily. It ends in loss of sight, with a dilated pupil and opaque lens. Sometimes the latter change does not occur, but there is deep-seated green discolouration of the pupil, that is, the appearance called glaucoma: the disease might then be named *acute glaucoma*, in contra-distinction to the slowly occurring change of similar character, which will be afterwards described. Beer* has given an account of it under the name of *arthritic iritis*, thus leading to the erroneous notion of its being confined to the iris, although his own description of its progress and destructive influence on vision, as well as of the changes of structure produced in various parts of the globe, shows it to be much more extensive. This disease almost invariably destroys sight: while the eye will recover completely from repeated attacks of arthritic iritis. **Benedict**[†] and **Rosas**[‡] have given it the appropriate name of *ophthalmitis arthritica*, because it attacks gouty persons, and involves the whole globe. A severe burning or tearing pain is felt deep in the globe, with a sensation as if the eye were too large for the orbit. At the same time, a dull and rather livid redness is developed in the sclerotica, increasing in intensity to the edge of the cornea, from which, however, it is separated by the narrow white ring mentioned in the description of arthritic iritis. Soon the vessels of the conjunctiva become distended, and the cornea loses its brightness. In the beginning there is increased sensibility to light and lacrymation. The pain of the eye becomes severe and almost intolerable, and extends to the orbit, face, and side of the head: it entirely prevents rest, and sometimes is hardly lessened by the most active treatment. The iris is rendered darker and dull, the pupillary margin being turned backwards, and the opening itself dilated and fixed, sometimes having an oblong figure in the transverse direction. A dull green discolouration is observed deep in the eye, indicating loss of transparency in the vitreus humor. The latter, or the posterior tunics generally, swell, and push forwards the lens into the dilated pupil, wedging it into the aperture, and squeezing it against the cornea. Under such circumstances, or without being thus displaced, the lens loses its transparency, turns of a dull green, yellowish green, or dull white, forming a *green* or *glaucomatous cataract*. This vascular congestion, and consequent swelling of the internal parts, distend the sclerotica, and give to the globe a stony hardness. The disturbance in the vessels of the sclerotica extends to the cornea, often causing considerable haziness; this change, and those in the iris and pupil, destroy all the brilliance and expression of the organ, making it look almost like a dead eye. Sight is greatly impaired, often entirely lost, from the very beginning: this loss of sight may be sudden, taking place in the course of a night. Yet the patient often perceives luminous appearances, although unable to distinguish light from darkness; and from time to time a glare of light is seen, which leads to the fallacious hope that sight may be recovered.

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* *Observations on the history and treatment of the ophthalmia accompanying the secondary forms of the lues venerea*, p. 109—114.

† *Lehre*, vol. i., § 567—572.

The pain and the redness lessen, and the affection subsides,

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[*] *Handbuch*, vol. ii. p. 263.

[†] *Handbuch*, vol. ii. § 814—828.

leaving an iris of a dull leaden hue, a fixed and dilated pupil, either of a dull green colour, or occupied by a glaucomatous cataract, with total and irreparable loss of vision. The external trunks lying on the sclerotica are enlarged, knotted, and varicous, *(varicositas oculi,*[*] *cirsophthalmia, varicous ophthalmia.)* Sometimes there is distension with partial absorption of the sclerotica, giving it a dull leaden appearance, especially in the situation of the ciliary body, causing small projections, supposed to arise from varicous enlargement of the choroid veins, or the larger bulgings, which constitute staphyloma scleroticæ, and alter the form of the globe. These appearances in the sclerotica must be ascribed to a morbid condition of the choroid and other internal parts. Mr. MACKENZIE says, that in a preparation belonging to BEER he saw varices of an inflamed choroid as large as small peas.[†] It has been found in some cases that effusion of fluid has occurred between the choroid and retina.

The disorder generally affects the two eyes in succession; but both may be attacked at once. The course of the affection varies in rapidity and severity of symptoms. Sometimes sight is more slowly extinguished, pain is less, and even inconsiderable, the change in the iris is not so remarkable; the varicous enlargement of the external vessels is not seen.

The pathology is imperfect from the want of dissections. We do not know where the disease begins; what structure is its primary and essential seat. The early diminution or entire loss of sight shows us that the retina is disordered in the very outset, and that it undergoes serious disorganization; the changes in the pupil indicate alteration in the vitreus humor; while the tension of the globe and the bulgings of the sclerotica imply congestion and swelling of the choroid.

The chief cause of the affection is an unhealthy state of constitution; it takes place in gouty subjects, and in such as have had other forms of gout. We see it in elderly persons, always after the middle period of life; in those of full habit, of corpulent make, with the bloated, red, purple, and veined faces, that denote habits of indulgence.

It is important to distinguish this affection from cataract; from amaurosis, properly so called; and from common internal ophthalmia.

The prognosis is entirely unfavourable. Where vision is lost in such a case, it is never restored; nay, if the characteristic symptoms are present, we may be tolerably certain that the disease will go on to the extinction of sight, and we cannot prevent it. The disorder is indeed so unmanageable, that treatment has very little effect upon it: the severe pain in the eye and head continues in spite of the most active measures. Loss of blood and other corresponding means must be resorted to in the beginning. Subsequently, blisters may be employed, with Plummer's pill, mild aperients, and a regulated diet.

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[*] BEER, *Lehre*, vol. ii. p. 247.

[†] *Practical Treatise*, p. 460.

CHAPTER XIX.

AFFECTIONS OF THE EYE-LIDS.

SECTION I.—INFLAMMATIONS AND THEIR CONSEQUENCES.

Secondary inflammation of the palpebræ.—The eyelids are involved in external inflammations of the globe; that is, in common, catarrhal, purulent, and strumous ophthalmiæ. We do not see a severe case of these inflammations, particularly of the three first, without more or less inflammation of the lids, while in many cases the redness, swelling, and pain of the latter are considerable. This influence is not reciprocal: the more important organ acts on the subordinate and secondary parts; but the latter do not re-act on it. The globe of the eye does not suffer, or perhaps the conjunctiva is only a little reddened in erysipelatous inflammation of the lids, although they are often enormously swollen, with the integument bright red, and the cellular tissue in a state of purulent infiltration and mortification. The same observation holds good in most cases of small-pox, and in traumatic inflammations of the lids. The latter do not become inflamed in the internal ophthalmiæ; that is, if the disorder is confined to the internal tunics.

Primary inflammations of the palpebræ.—Abscess of the eye-lids.—The cellular texture is liable here, as in other parts, to inflammation,* which may proceed to suppuration. There is nothing peculiar in the abscess thus formed, nor in the essential points of treatment. The matter may approach to the surface on either aspect of the lid; or it may be present in both situations at once. In order to avoid subsequent deformity, we should endeavour to limit the extent of suppuration as much as possible. An early opening of the abscess is necessary for this purpose. If the integuments of the upper lid become distended by a large collection of matter, the consolidation of the abscess may cause the tarsus to become unnaturally fixed to the superciliary ridge, and ectropium with great deformity ensues. This point is still more important in scrofulous than in common suppuration, because the matter extends laterally, with little disposition to approach the surface; and consequently, if left alone, will occupy the whole lid. I have seen about half a dozen instances, in which eversion of the superior tarsus and distressing deformity have resulted from this cause, the external convexity, or the very ciliary margin of the tarsal cartilage, having become closely attached to the edge of the orbit. In one case, of a young gentleman from Scotland, where the appearance was so very disagreeable that he kept the eye constantly covered by a close green shade, and consequently was prevented from using the organ, I succeeded, by a painful operation, and much subsequent trouble, in removing the deformity entirely, and in restoring the eye. In another instance, of a highly scrofulous subject, an abscess was allowed to burst in each upper eye-lid, producing ectropium on both sides, which greatly disfigured the individual, and could be only partially remedied. Fistulous excavations sometimes remain after palpebral abscesses.

Serous effusion takes place into the cellular texture of the eye-lids, when inflammation exists in the neighbourhood, either from accident or disease, especially if it proceed to suppuration. They sometimes swell considerably from trivial causes, such as leech-bites, the bites or stings of insects, the irritation of hordeolum. They are often enormously enlarged in inflammation of the lacrymal sac and in erysipelas of the face. The eyes are closed, and the patients, being unable to open them, are alarmed by the fear of blindness, until the nature of the case is explained. The swelling, which constitutes the *œdema palpebrarum calidum*, or *inflammatorium*, goes away as the cause which produced it subsides. The lids are swelled, but not so considerably, in anasarca of the face *(œdema frigidum* or *chronicum.)* If this kind of swelling were troublesome, especially by closing the lids, the serous fluid might be let out by a small puncture or two. As the globe is not affected, vision is in no danger; the swelling goes away as the cause which produced it subsides.

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* *Blepharophthalmitis idiopathica*, BEER, vol. i. § 291. *Blepharitis idiopathica*, JUENGKEN, p. 144.

Ophthalmia tarsi.—In the cases just alluded to, the integuments and cellular texture of the palpebræ are the seat of disease; in catarrhal inflammation of the lids, which is described in CHAPTER VII., the mucous membrane is affected. There is another inflammatory affection of these organs, in which the mucous membrane, the tarsal cartilage and glands, and the ciliary margin, are involved, to which the old name of *ophthalmia tarsi* might be appropriately assigned. There is a bright red, and extremely painful swelling occupying the edge and neighbouring part of the lid; the palpebral conjunctiva is bright red and villous. Motion of the part is attended with the most acute pricking sensation, and feeling of foreign substances in the eye, so that the lids are kept closed and at rest. There is lacrymation with more or less intolerance, and feverish disturbance of the system. The ciliary margins, at first dry, become moistened by increased mucous secretion, and are firmly stuck together in the morning.

Active antiphlogistic treatment is required. I have sometimes found venesection and cupping from the temples necessary. Cold lotions and mild unctuous applications are best in the early stage; frequent ablution with tepid water may be advantageous afterwards. When the active inflammation is completely subdued, the case must be treated in the same way as the chronic catarrhal affection, or lippitudo. (See CHAPTER VII.) Repeated attacks of this inflammation seriously affect the tarsal cartilages, causing them to contract and turn inwards, and thus producing trichiasis or entropium. The ophthalmia tarsi is sometimes milder in degree and chronic in form. There is hardly any perceptible swelling, and but little redness. Yet the uneasiness is considerable, with troublesome tingling and itching, and the lids stick together in the night. Mr. WARE called the affection *psorophthalmia*, from the itching; it has also been called *lippitudo pruriginosa*. The treatment is the same as that of lippitudo; and the same kind of means must be adopted, when there is a sense of dryness and stiffness in the eye, with uneasiness of the lids at their margin, although there should be neither swelling nor redness.

Scrofulous inflammation of the eye-lids.—Thickening and redness of the ciliary margins are very common in the scrofulous, and are habitual insome subjects, so that they are not regarded as disease. Strumous ophthalmia frequently begins with inflammation of the lids; and the latter affection, in a more or less active form, characterised by the symptoms already described, accompanied by the frequent occurrence of hordeola, and often causing, when neglected, ulceration, enlargement, induration; and irregularity in figure of the affected part, with partial or general loss of the cilia, is common in the scrofulous. It must be treated, locally and generally, according to the principles already explained as applicable to common inflammation of the lids, and strumous ophthalmia.

Inflammation of the eye-lids with ulceration; blepharophthalmia ulcerosa; ophthalmia psorica; tinea of the eye-lids.—The edges of the lids swell and become red in children, with great pain and itching. Pustules like those of tinea form on the inflamed part, particularly about the roots of the cilia. These break and pour out a yellowish matter, concreting into more or less firm yellow or brownish scabs, which mat together the cilia, and sometimes adhere very closely to the surface. As this affection is seated along the roots of the cilia, it affects their growth, altering their form and direction. The ulcerations extend deeper and deeper, and at last destroy the bulbs of the cilia, which come away with the scabs.*

The Germans regard this disease as itch of the eye-lids, and they employ the terms *psoropthalmy* and *ophthalmia psorica*† in that sense. They consider that it may be produced by immediately applying the contents of the vesicles or pustules of itch to the eye-lids, or that it may come on when itch has been suddenly cured. I do not consider that there is any connexion between this disease and scabies, or that there is any further analogy between them except in the circumstance of itching, which is common to both. I have seen innumerable cases of itch in its most aggravated form, but have never met with inflammation either of the eye or lids in such instances, either during or subsequent to the eruption. When the body has been covered with scabies to the greatest degree, I never saw any kind of ophthalmic disease attributable to this cause; indeed it is well known that the head and face are nearly exempt from this loathsome disorder. Nor has the rapid cure of the itch by suitable treatment, in instances of its most extensive prevalence, had any injurious effect within my experience.

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* When the ciliary margins are considerably swelled, and numerous pustules have formed on them, the appearance has been compared to that presented by the section of a fig.: hence the terms *sycosis*, *palpebra ficosa*.

† BEER, *Lehre*, vol. i. p. 565. BENEDICT, *Handbuch*, vol. ii. p. 131. ROSAS, *Handbuch*, vol. ii. p. 242. He calls it *conjunctivitis psorica*. JUNGKEN, p. 298. He says, "it is true itch of the eye-lids, fixing its seat particularly in their external surface, and characterised by scabious pustules and ulcers. It is rare, and only seen in the lowest class: in Poland and Lithuania it is more frequent."

Treatment.—Antiphlogistic means and mild local applications are necessary in the first instance; astringents and stimulating ointments, particularly the latter, are proper subsequently.

*Thickening and induration of the palpebral margins; Tylosis.**—The ciliary margins, after long continued slow inflammation, become thickened, indurated, and knotty, especially in the scrofulous. They ulcerate irregularly, and incrustations form about the lashes, which are often partially or generally detached. This swollen and knotty state of the lids, in which their margin often loses altogether its natural figure and appearance, has been technically called *Tylosis*. In this state, or in aggravated cases of tinea, where the ulcerated margins of the lids are covered by hard incrustations, which, together with the cilia, prevent the application of remedies to the seat of disease, the best plan of treatment is to extract all the cilia, with a pair of broad forceps, and then touch the surface over lightly with a pencil of lunar caustic. This has a great effect in healing the ulcerations and dispersing the swelling. The citrine ointment should be used afterwards, and the caustic may be repeated in a few days. Three or four repetitions are generally sufficient.

Loss of the eye-lashes. (*Ptilosis, madarosis, alopecia.*)—Destruction of the bulbs by ulceration or by injury causes permanent loss of the cilia, which may be either total or partial. It is a frequent result of small-pox, the pustules of which, besides partially destroying the lashes, leave reddish marks of unpleasant appearance on the margin of the lids, with disposition to inflammation. The loss is irremediable; but when the disorder which caused it has completely ceased, the effect on personal appearance is much less than would have been expected, especially when it has been total: the partial loss is more conspicuous. The entire absence of cilia is sometimes hardly observed, especially in those of light hair; while, at least in many instances, it is not attended with the slightest inconvenience. The latter observation was exemplified in a lady, in whom the eye-lashes had fallen out without disease of the lids, the hair having at the same time disappeared from all parts of the body without any apparent cause.

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* This word is formed from τυλος, *callosity*. The words *pachyblepharosis, pachea blephara, and pachytes*, denote the enlarged and thickened state of the lids. *Ptilosis*, which originally means the moulting of birds, has been applied to this disease, which is attended with loss of the cilia.

I saw a young lady in whom the lashes of one upper eyelid had dropped out without previous inflammation, or any other ascertainable change in the part. My opinion was that they would not be reproduced; but I recommended the trial of a stimulating ointment, and the ung. hydrarg. nitrat. in a dilute form was consequently employed. After the lapse of some months the hairs again appeared, and were ultimately restored, of natural size, colour and number.

The cilia are reproduced after being plucked out, and that very speedily; a circumstance which is found very inconvenient by those affected with trichiasis. We may therefore safely remove them in ulcerative affections of the lids. Such removal indeed, by facilitating the application of suitable remedies to the ulcerations, prevents them from proceeding to destruction of the bulbs and consequent permanent loss of the cilia.

Pediculi ciliorum. Phtheiriasis.—Foreign writers speak of pediculi occurring on the cilia, and occasioning by their irritation slight ulceration of the lids. A child came to the London Ophthalmic Infirmary, complaining of the eyes being sore, and said they itched very much. I looked at the eye, which did not appear diseased, but I thought that the cilia seemed thick, and on a more accurate examination, I found that this was caused by an infinite number of pediculi sticking over the hairs. I ordered the free application of the citrine ointment, and wished to see its effect; but the mother, who came with the child, was so much offended at being told the cause of the complaint, that she did not bring the child back again. The mother and child were clean and respectable. I have seen these vermin on the eye-lashes only in one other instance. In general appearance they resemble the crab-lice more than those of the head.*

Hordeolum, or *stye*, is a small, rather firm, inflammatory tumour, bright red, and generally very painful, formed in the ciliary margin of the lid. It may be situated more towards the external or internal surface, and hence the distinction of *external* and *internal hordeolum*. A small conical elevation takes place, which, after a time, shows a whitish point in the centre; suppuration has occurred; and the matter it contains makes its way out. This inflammation is generally attended with the formation of a small slough; it is a boil in miniature. The density of the texture explains the acute pain attendant on this form of disease, and the extension of the redness in some cases over the whole lid. The process of suppuration is not quick; and when it has taken place, ulceration slowly follows, and the slough gradually makes its way out. Some hordeola form more quickly, with greater suppuration and no slough; but, generally speaking, they are slow, and several occur in succession in scrofulous individuals (*hordeolum scrofulosum*.) In such constitutions, the inflammatory process is sometimes very chronic, and leads to enlargement and induration, rather than suppuration.

Treatment.—We may perhaps prevent suppuration in the very outset by the use of purgatives and cold lotions to the part. In general, however, the boil goes through its regular course. Tepid fomentation, or the softest bread and milk poultice, will suit best while matter is forming and coming to the surface. Leeches and active aperients may be necessary if the inflammation runs high. If suppuration has decidedly occurred, and the local uneasiness continues, relief may be afforded by puncturing the part. A premature puncture is injurious, as in the case of boils; and in general it is best to leave the disease to its natural course. When the inflammation has subsided, a mild course of alterative and aperient medicine, with attention to diet, and the local employment of the citrine or red precipitate ointment, will be advisable in scrofulous subjects, as measures of prevention. When the inflammation is stationary, the removal of the swelling may be hastened by touching it with the nitrate of silver.

BEER mentions that the prognosis is always very unfavourable in scrofulous hordeolum; that it may lead to true carbuncle or anthrax, and thus to destruction of the eye-lid, or to scirrhous induration and cancer.* I never saw such effects, and consider these dangers purely imaginary.

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* DEMOURS states that neither he nor his father had ever seen lice on the cilia.—*Traité des Maladies des Yeux*, tom. i, p. 81.

SECTION II.—ULCERATIONS.

Carcinomatous ulceration of the palpebræ will be considered with malignant affections of the eye.

SYPHILITIC DISEASES OF THE PALPEBRÆ.

Syphilitic eruptions.—As integument and mucous membrane are the most frequent seats of syphilitic disease, and as both these structures enter into the composition of the eyelids, we might naturally expect to find those parts often involved in such affections. Syphilitic eruptions, particularly the scaly and the tubercular, frequently appear on the external surface and on the ciliary margins of the lids; and the latter are almost always red, excoriated, and sore, (*lippitudo syphilitica neonatorum*,) in that form of syphilis, which is imparted to the infant by a diseased mother or nurse, and which is almost confined to the skin.

The mucous lining of the palpebræ sometimes participates in the syphilitic eruptions, which affect the surface generally; but this does not happen so often as we might have been led to expect from observing the correspondence in diseased action between the conjunctiva and the integuments. In a case of syphilitic iritis, where there was papular eruption, papulæ were observed on the internal surface of the eye-lids. A gentleman was under my care some years ago with general papular eruption, following chancre, the pimples being numerous, large, bright red, and proceeding to suppuration on their summits, then drying up and leaving very conspicuous red marks. There was great feverishness, with pain in the side. The eruption extended to the mucous lining of the palpebræ, in which there were several yellow pustules, about as large as pins' heads, with some uneasiness, and general swelling of the lids. They required no particular treatment. The eruption, which occurred in March, lasted six weeks.

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* *Lehre*, v. i. § 585, 586.

The marks of the papulæ were still very visible in the face in August; at which time some scaly eruptions appeared on the legs, with considerable inflammation. The left upper lid was still red, and rather swelled, the conjunctival lining red and thickened, and the marks of the former papulæ very evident. No other means were employed in this case except active antiphlogistic treatment, including two venesections. This gentleman has continued well to the present time.

In a patient, who was twice in St. Bartholomew's Hospital under my care, first for primary phagedenic ulceration of the labia and one nympha, and subsequently for tubercular eruption chiefly affecting the face, and node of the tibia, the upper eye-lid of one eye became swelled on the second occasion. It is stated in notes which I have of the case, that an "eruption of small pustules was observed upon the lining of the upper eye-lid, which was swollen." I cannot describe the appearances exactly, not recollecting the particulars of the case, which occurred in 1825 and 1826. She took calomel and opium freely, under which all her symptoms quickly disappeared, and she was discharged cured.

Syphilitic ulceration of the eye-lids.—Although this is not of very rare occurrence, it is not particularly noticed in any of the works on syphilis with which I am acquainted. As it sometimes proceeds to the destruction of the lid, it is of consequence that the character, progress, and treatment of the affection should be understood.

My attention was first attracted to the subject many years ago, by a case which came under my care in St. Bartholomew's Hospital. A stout red-faced woman, of full habit, who had been long on the town, was admitted on account of an ulcer, which had nearly destroyed the lower eye-lid. The surface was greyish with bloody points, and the edge towards the cheek livid and sloughy; the discharge ichorous. The neighbouring integument to a considerable distance was highly inflamed, and the side of the face was generally swelled. The sore and the surrounding parts were acutely painful, so as entirely to prevent rest. No eruption or ulceration existed in any other part of the body, nor was there any other local affection. Having neither heard nor read of such cases, I did not entertain any suspicion of the disease being venereal, and attempted to arrest its progress by leeches, fomentation, poultice, and opium. During the employment of these measures, which were altogether ineffectual, the destruction of the lid was completed. I now had recourse to the free administration of calomel with opium, which quickly affected the mouth. The pain immediately ceased, the inflammation of the ulcer and of the surrounding parts was arrested: in two or three days the sore acquired a healthy surface, and cicatrization soon followed. Although this patient had no other venereal disease at the time, and said that she had not recently been affected with syphilis, I entertain no doubt at present that the ulceration of the eye-lid was syphilitic.

Soon afterwards I had under my care, at the Eye Infirmary, in Charterhouse Square. a youth under twenty years of age, in whom a chronic ulceration had slowly destroyed about one half of one lower eye-lid, the other being affected on its margin by a smaller superficial ulceration of similar character. In this case there was an excavated ulcer with tawny surface, and no surrounding inflammation, in each tonsil. The characters of the disease were here so strongly marked, that I could place no credit in the representation of the patient that he had never had venereal disease. The compound decoction of sarsaparilla, with the oxymuriate of mercury, was administered in this case. The ulcerations of the throat soon disappeared; but those of the eye-lids were more obstinate, and did not yield till the mouth was affected, when they slowly cicatrized. A relapse of the palpebral affection occurred in this patient, who was a tailor; the use of mercury was again required, and proved effectual.

In the last few years I have met with several instances of syphilitic ulceration affecting the eye-lids, and have thus learned that the character and progress of such sores are various in this as in other parts of the body.

The ulcer, commencing on the ciliary margin, where it is generally described as beginning with a small hardness, supposed to be a stye, may occupy the whole thickness of the lid, involving all its textures. It may have the same origin, and be confined to the external surface of the lid; or, it may arise on the mucous surface, and never extend beyond that. In a patient, who had syphilitic ulcers in several parts of the body, with periosteal swellings, I observed that the left upper eye-lid was red and swollen, and proceeded to evert it, when I discovered on the inner surface a sore as large as a sixpence, with a tawny surface: it did not reach the edge of the lid. I have also seen several smaller sores at the same time in the mucous lining of both upper lids.

The ulceration is sometimes acute, attended with inflammation and great pain; and it rapidly destroys the affected part.

In a case, where the eye-lids were twice affected, two-thirds of the lower lid were destroyed on the second occasion in about five days. On the contrary, in another instance, there was but little inflammation or pain, and, although the disease had existed for two months before treatment was begun, the cure was accomplished almost without loss of substance. The characters of the sore will of course be very different in the two instances. The acute ulceration is of the phagedenic character, with red margin, sharp edge, foul unequal surface, on which bloody points are seen, and severe pain. In the chronic, there is swelling and some hardness of the basis of the sore, with expansion of the cutaneous texture instead of loss of substance, and little or no pain.

Ulceration of the eye-lid generally occurs in conjunction with other syphilitic symptoms, such as ulcers in other parts of the body, and swelling of the bones or periosteum. In one patient the affection of the lid was the only secondary symptom for about two months, at the end of which time scaly eruption appeared. In two other instances the eye-lid was the only part affected. I was consulted some years ago by a gentleman, of whose case I did not make any notes. He had a large ulcer, with dirty whitish surface, on the lining of the upper eye-lid. The character of the sore, and the circumstance of his being otherwise in excellent health, made me conclude that it was venereal, though he had no other symptom, and stated that he had not been affected with syphilis for a long time; if my memory is correct, not for three or four years. The sore healed under the use of mercury and sarsaparilla.

In some instances of entire destruction of the lower eye-lid there has been no conspicuous deformity, and the patients have experienced no inconvenience after cicatrization was completed. The loss could not be discovered without close inspection; and when the eye was shut, the descent of the upper lid covered the globe.

No other ulcerative affection of the palpebræ can be confounded with that now described by any person who pays even slight attention to the character and progress of the disease. The ulcers called cancerous begin, at least in the great majority of instances, in the integument, and are for a long time confined to it, not reaching the ciliary margin or mucous surface until the disease has made some progress The affection has two stages, the tubercular and the ulcerative. It begins with the formation of small, hard, and scarcely discoloured tubercles in the skin; ulceration does not take place till these have existed many months or even some years; it proceeds slowly, the edge of the ulcer being hard, and tuberculated, and several years will elapse without any great progress. The ulcer is superficial, producing in small quantity a thin discharge which forms an adherent scale on the surface. These cancerous ulcerations do not occur until the middle period of life, or after it. Besides the difference of age, and the entirely different origin, development, character, and progress of syphilitic ulceration, the history of the case, and the concomitant existence of other syphilitic symptoms would remove all doubt respecting the nature of the affection.

Treatment.—I have found the free use of mercury to be the quickest and most effectual mode of arresting and curing the disease. This remedy has been employed with the best effect in all the cases which have come under my observation. As soon as its influence on the system has been produced, the sores have lost their syphilitic character and then quickly healed. Having found the desired purpose so completely answered by this plan of treatment, I have not been willing to make the experiment, which has been tried with other syphilitic ulcerations, of leaving them to their own progress, or trusting to sarsaparilla and other remedies. The loss of substance which might occur under this mode of proceeding, would be attended with serious deformity in the case of the upper eye-lid.

SECTION III.—CHANGES OF FIGURE AND POSITION.

Ptosis; Blepharo-ptosis; Lapsus Palpebræ Superioris.

By these names is designated a falling of the upper eye-lid, with a partial or complete want of power to elevate it. Such a state may exist for a time, with enlargement of the part, in consequence of inflammation or injury. It gradually disappears without any local treatment. There seems to be no difference between this state and that which BEER[*] has spoken of, under the name of *relaxation of the eye-lids (atonia palpebrarum; atoniaton blepharon.)*

JUENGKEN distinguishes four kinds of *blepharo-ptosis;* viz.

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[*] *Lehre*, vol. ii. p. 15.

1st, *senilis*, generally leading to entropium; 2nd, *traumatica*, from wounds; 3rd, *symptomatica*, from abscess or tumours; 4th, *congenita*. The latter, he says, sometimes appears in several members of a family.[*]

I have seen a few instances of this congenital imperfection. In the case of a gentleman, who consulted me for it, the lids could not be opened, on either side, by voluntary effort, to more than one third of the usual extent; and when this was accomplished, the upper palpebra was quite smooth, without any fold between it and the eye-brow. It was necessary to throw back the head, in order to see objects above the level of the eye. There was striking peculiarity in the expression of the countenance. This patient derived great advantage from the removal of a portion of skin, as in the operation for entropium. He informed me that he had a sister, in whom the imperfection was greater than in himself. I saw a young girl with one eye in a similar state.

The name *ptosis* is sometimes applied to the falling of the lid, consequent on paralysis of its levator muscle, the *ophthalmoplegia* of some authors. Sometimes the want of power over this muscle is the only disease; the other muscles, supplied by the nerve of the third pair may be also involved; or there may be squinting, double vision, or amaurosis. If the eye-lid be lifted, it slowly falls down again, over the eye, and the patient either is unable to move it by voluntary exertion, or can raise it only partially. This affection, which is not uncommon, is produced by disease within the head, and hence it is sometimes the precursor of apoplexy. It must be treated in the same way as other paralyses consequent on disease of the brain; that is, by abstraction of blood, aperients, low diet, and the administration of mercury. After the former measures, and in conjunction with the latter, counter-irritation is of great service, by blisters to the nape, behind the ear, on the temple or forehead, by the tartar emetic ointment, or by seton. Some have particularly recommended the application of caustic,[†] or moxa, between the angle of the jaw and the mastoid process; but I have never found it necessary to have recourse to that measure. To insure a successful result, it is sometimes necessary to persevere for a long time in the plan of treatment now recommended. If the power of the levator should not return in a few weeks, electricity may be tried.

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[*] *Handbuch*, p. 701—704.

[†] On a new Method of treating Paralysis and permanent Spasm of the Eye-lids, (*blepharoplegia* and *blepharospasmus tonicus*,) by J. A. SCHMIDT, in the *Abhandlungen der Med. Chir. Josephs Akademie*, vol. ii.; also in the *Ophthalmol. Bibliothek*, vol. ii. st. 3.

I subjoin the following case to illustrate the nature and treatment of the affection.

CASE.—E. B., forty years of age, came under my care at St. Bartholomew's on the 11th of July, 1827. She was a short thin woman, whose habits of drinking porter and spirits had given her a very sallow, unhealthy countenance. A week before, and three days after having been intoxicated, she felt pain in the head, and giddiness, immediately succeeded by dimness and confusion of vision, which continued to the time of her admission. July 11th. The upper lids hang loosely over the eyes, and she has no power of elevating them. The irides are motionless, the pupils contracted, with a dull and muddy appearance. Vision is dull; best in a weak light. She can make out a large print by looking steadily at it for some time, not otherwise. There are constant pains in the head, and giddiness. The pulse is full, hard, and increased in frequency; the tongue white. (Venesection and an active purgative.) 12th. The patient fainted when six ounces of blood had flowed from the arm; six leeches were therefore applied to each eye. Pain and giddiness lessened; vision improved. Pulse still frequent and hard. Venesection was repeated to twelve ounces, and fainting took place. The patient said that she could see objects more distinctly while the blood was flowing, and that the giddiness had ceased. 13th. Return of pain. (Cupping on the back to fourteen ounces. Pil. hydrarg. g. v. nocte maneque quotidie.) 15th. The levatores palpebrarum have nearly regained their full power. Vision is distinct in a weak light, but rather confused in the middle of the day. Pulse natural; slight pain in the head. (Twelve leeches to the temples; opening medicine.) 19th. The mouth is sore. (Continue the pill at night only.) 30th. Relapse of disease from drinking wine, which had been clandestinely brought by friends. Pulse frequent and hard; tongue white; severe headache; levatores completely paralyzed, and vision indistinct. (Leeches to the temples, blister to the nape, opening medicine.) 20th. Discharged quite well, leeches having been again applied to the temples, and an abscess of considerable size having been formed in the axilla, punctured and healed. She came to the hospital in September in excellent health, and without a trace of the former symptoms.

The position of the lids in respect to the globe may be altered by disease; they may be either turned outwards, so as to expose their mucous lining, or inwards, when the cutaneous surface is directed against the eye. There may be simply this unnatural direction; or it may be accompanied by other alterations in the structure and figure of the part.

Ectropium.—The turning outwards of the lids, which is most frequent in the lower, has both a Latin and a Greek name, *ectropium* and *eversion.* It is either temporary or permanent. The former occurs in some inflammations, and is frequent in the purulent ophthalmia of infants. It disappears, as the inflammation is remedied, or under the treatment described in the account of the purulent ophthalmiæ.

Permanent eversion may arise from various causes, and requires corresponding variety of treatment. It is frequent in the lower lid, as the result of lippitudo. The palpebral conjunctiva becomes thickened by long-continued and repeated inflammations, while the skin, excoriated or even ulcerated by the discharge, shrinks, becomes shortened, and thus draws the edge of the lid outwards. The exposure of the mucous membrane to the air and other sources of irritation, increases the inflammation and thickening, until it degenerates at last into a more or less considerable red and nearly callous growth; the case being then called fleshy ectropium. *(e. sarcomatosum.)* It is necessary to remove chronic lippitudo, if it should still exist, and to re-establish a healthy state of the palpebral margin and Meibomian secretion. No application answers this purpose better than the red precipitate ointment, which may be freely applied to the everted and thickened surface, as well as to the ciliary margin of the lid; it reduces the swelling of the conjunctiva, and rectifies the secretion of the tarsal glands. Ectropium, even when accompanied with much thickening of the conjunctiva, may be remedied in this manner. If the latter affection should be obstinate, the membrane may be lightly touched with the nitrate of silver. The shrinking thus produced in the internal surface draws the edge of the lid into its natural situation. If the sarcomatous growth of the conjunctiva should be too considerable to be reduced by the means just specified, it will be necessary to shave off the thickened membrane; the contraction produced by the cicatrization of the surface will draw the edge of the lid into its proper position. When the eversion is considerable and of long standing, the tarsus becomes changed in figure, and elongated, so that it is no longer adapted to the convexity of the globe, even if the lid were restored to its proper situation.

It may be brought to the proper length by removing a portion of the whole thickness shaped like the letter V; the two oblique incisions, beginning at the ciliary edge, will unite in an angle below. This may be done with a pair of sharp scissars or a knife; the sides of the artificial fissure thus made must be brought together by sutures.

Either lid may be everted by the cicatrization of ulcers, consequent on injuries with loss of substance, particularly burns. In bad cases of this kind, we sometimes see the lower lid drawn away from the globe, and the entire tarsus firmly fixed to the cheek. These are troublesome cases, and we have no effectual remedy for some of them: if the cicatrix be cut through, the healing of the wound reproduces the displacement of the lid. It has been proposed, after liberating by incision the confined lid, to dress the surface of the sore with irritating ointments, such as the unguentum lyttæ, or the yellow basilicon, in order to produce abundant granulations, in the hope of supplying the lost substance.

Juengken[*] mentions a proceeding as having been employed by **Jaeger**, of Vienna, and subsequently by himself, with advantage. It consists in completely detaching the everted lid from the cheek or superciliary ridge, leaving it connected at the angles only. This is accomplished in the lower lid by entering a sharp-pointed double-edged knife through the conjunctival surface, near the inner angle, and bringing it out through the skin on the cheek; it must then be carried on transversely to the outer angle. A sarcomatous growth of the conjunctiva may be previously removed, if necessary: and a triangular portion of the lid may be removed after the above-mentioned incision, if such a proceeding be advisable. The detached lid must now be fixed, accurately and firmly, in contact with the globe, and the integuments of the cheek must be drawn up towards the eye, and maintained in that position by adhesive straps, compresses and bandage. An analogous proceeding is applicable in the upper lid.

Professor **Dieffenbach**, of Berlin, has practised the following operation for ectropium. He makes an incision through the skin and orbicularis, nearly parallel to the edge of the lower lid. It begins two or three lines from one angle, and ends at the same distance from the other. It is one line from the edge of the lid at its two ends, and two or three lines in the middle. He turns up the small flap of skin thus made, and dissects through the lid to the conjunctiva, which he divides to the extent of the external wound. With forceps he draws the external edge of the divided conjunctiva into the wound of the integuments, and unites by sutures, which pass through the conjunctiva as well as the skin.[*]

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[*] *Handbuch*, p. 696—700.

Ectropium of either lid may be consequent on the healing of an abscess, especially if it be scrofulous, or connected with disease of the bone. In the latter case the integument is drawn in and fixed to the bone at one point. Shortening of the lid is generally combined with the eversion. This shortening, in the case of the upper lid, constitutes the *lagophthalmos* or *oculus leporinus*. The combined shortening and eversion were exemplified in the cases alluded to at p. 336. It has been the practice in such cases to expose, by a transverse incision, the induration extending from the cicatrix to the orbit, to dissect it away, and then to unite the wound. The eye-lid and neighbouring integuments must be retained in a suitable position by adhesive stripes, compress, and bandage. I adopted this proceeding, together with excision of a triangular portion of the lid in the instances just referred to. Professor AMMON[†] detached the indurated portion from the integument and surrounding soft parts, leaving it adherent to the bone, and closed the external wound over it.[‡] JUENGKEN proposed to supply what was deficient in the length of the lid, in bad cases of lagophthalmos, by transplanting a portion of skin from the forehead or cheek, as in the operation of making a new nose from the forehead.[§] The proceeding failed entirely in two trials, which he has since made; [‖] but it is said to have succeeded with Dr. FRICKE of Hamburg, who has described it in a tract,[¶] which I have not seen.

Entropium, or inversion of the lids, which may be either temporary or permanent, partial or complete, is more injurious to the eye than ectropium, being often accompanied with great mechanical irritation, from the rubbing of the lashes against the globe of the eye, which produces severe inflammations, with ulceration and opacity of the cornea.

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[*] RUST'S *Magazin*, vol. 30. p. 438. AMMON'S *Zeitschrift*, vol. i. No. 33.

[†] *Ueber lagophthalmos und ectropium a carie marginis orbitalis*; *Zeitschrift*, vol. i. No. 3.

[‡] A new method of operating in lagophthalmos has been adopted by Professor JAEGER, and described in an inaugural dissertation by DREYER; *de nova blepharoplastices methodo*, c. tab. ii. Vindob. 1831. An account of the proceeding is given, as an analysis of this dissertation, in FRORIEP'S *Notizen*, vol. 30. No. 16; but as I do not understand it quite clearly, I have not described the method.

[§] *Lehre von den augenoperationen*, p. 267.

[‖] *Ibid.* Preface, p. 9, 10.

[¶] *Die Bildung neuer Augen-lieder*, *Blepharoplastick*. Hamburg, 1829.

Temporary inversion, particularly of the lower lid, will occur in chronic external ophthalmia, and sometimes even in more acute cases. The ciliary margin becomes contracted by repeated and continued inflammation; a spasmodic action of the orbicularis is produced, occasioning constant winking, particularly when attempts are made to use the irritable organ; the contraction of this muscle forces the eye-lid inwards, and then retains it in its unnatural position. The whole lid is absolutely rolled inwards, and the cilia frequently lie against the mucous surface of the lid, without irritating the eye; but, if the inversion be less complete, the eye-lashes are directed against the ball, with great aggravation of the inflammation. By drawing the skin gently downwards, the part which retains its natural figure may be restored to its proper position, but the patient presently winks, and the orbicularis turns it in again.

Treatment.—This temporary inversion may be generally remedied by slight mechanical means. It is sometimes sufficient to put a small compress against the lower portion of the lower lid, and retain it there by a stripe or two of sticking plaster placed transversely over it. Pressure in this situation restores the ciliary edge to its right position, and if it be retained there for twelve or twenty-four hours, the inversion will not be reproduced. In some cases it is difficult to retain the compress, on account of the tears flowing over the lid, and loosening the plaster; we may then succeed by employing a piece of double twisted wire, bent into the form of spectacles, so as to fit on the nose, and made to press upon the lower lid.

We are more frequently called on to remedy permanent inversions, accompanied with serious irritation of the eye from the pressure of the cilia against the globe.

There is frequently in elderly persons a relaxation of the integuments; the skin of the lid loses its elasticity, falls into wrinkles; the fat is absorbed from the surrounding parts; and thus loose folds are formed in the lid. The balance between the external surface and the mucous lining of the lid is lost, and inversion is the consequence. *(Entropium senile.)* The entire lid forms a round roll, the cilia lying in its interior; the essential form is not altered, and there is little or no irritation. I have seen this inversion in the lower lid of both eyes without the patient being aware of its existence. If we take up a fold of integument with the finger and thumb, or with a forceps, and draw it out a little, we shall restore the lid to its proper situation. The surgical remedy for the disorder consists in removing a portion of skin close to the edge of the lid, of such breadth as may be sufficient, when the cicatrix has formed, to bring the part back to its natural direction. The superfluous portion of integument may be got rid of by the application of a strong escharotic; the concentrated sulphuric acid will answer the purpose.* A small bit of smooth hard wood should be cut flat, and almost brought to a point, then dipped in the acid and drawn gently and repeatedly over the surface of the skin which it is wished to destroy. The greatest caution is necessary to prevent the contact of the acid with the ciliary margin, or the globe. The application must be continued until the proposed object is accomplished, which will generally require about ten minutes or a quarter of an hour. The acid turns the skin at first white and then brown; the skin contracts, shrivels up, and thus draws the ciliary margin of the lid outward. The portion of the integument thus destroyed soon separates and leaves a cicatrix, which is not conspicuous, although it answers the purpose of preventing the lid from rolling inwards.

The most effective mode of proceeding, however, is to remove a portion of skin by the knife or scissars. A fold of integument is to be taken up with a forceps, having small horizontal blades corresponding in length to that of the lid. Before making the incision, it is necessary to ascertain exactly how much skin ought to be removed; this is easily accomplished by taking up a fold with the forceps, and observing the effect on the position of the lid. If too much be removed, eversion is caused; if too little, inversion remains. The integument is sometimes so loose and redundant, that a broad piece must be removed; I have sometimes found it necessary to take away an inch. The incision should be as near as possible to the ciliary margin, just leaving room for the sutures. By this proceeding an elliptical portion of skin is removed; the broadest part should be at the point of greatest inversion. The forceps are sometimes made with a spring between the handles, so that having opened the extremities and taken hold of the skin, the spring retains that hold. I prefer those without a spring, because we can apply with the hand exactly the requisite degree of force. The pressure of the spring is sometimes insufficient, and the fold of skin consequently escapes. After having cut off the fold of skin, the edges should be united by two or three fine silk sutures, which should be cut out in about twenty-four hours; I never allow them to remain longer, the degree of adhesion being then sufficient to retain the edges of the wound in apposition. The cicatrization produces a permanent contraction of the part, and consequent restoration of the lid to its natural position. When it has been long inverted, and there is change of figure in the tarsus, with a tumid state of the lid and strong contraction of the orbicularis, it is not sufficient merely to remove a portion of skin. This proceeding remedies the inconvenience for a time, but it is soon reproduced. Therefore, after excising the fold of integument, take up a portion of the orbicularis, and remove it by the scissars. The contraction of this muscle, which has so much influence in causing and keeping up the entropium, is thus weakened; and the subsequent cicatrization, being deeper and firmer, affords a greater security against relapse.

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* This proceeding was proposed by HELLING. *Heilungsart d. umkehrung d. Augenlieder nach innen mit concentrirter Schwefelsäure*; in HUFELAND's *Journal*, 1815. st. 4. p. 98. vol. 40. See also his *prakt. Handbuch*, 1821, vol. i. p. 302. It has also been employed by QUADRI, *Annot. pratiche sulle malattie degli occhi*, 1818, p. 69. tav. i. iii.

BEER speaks of it in terms of strong commendation, having, as he says, employed it with complete success in cases that appeared almost desperate. *Medicinische Jahrbücher der kaiserl. königl. Œsterreichischen staaten*, band 4. stuck. 4. p. 166.

Another form of inversion, of which the cause is seated in the tarsus, occurs when the lid has been long the seat of chronic inflammation, or when it has been frequently the subject of inflammatory attacks. The consequence is, that the tarsus becomes corrugated and shortened, the ciliary margin is contracted and presses inwards, and the cilia turned against the globe, cause violent irritation, and keep up the inflammatory action which first produced the affection. This inversion of the lid and of the cilia will occasion severe external inflammation of the globe, ending in opacity of the cornea, and ultimately changing the texture of that part, by rendering it vascular, and converting its mucous surface into a tough, opaque, and almost insensible covering. In an incipient case, it may be sufficient to remove a portion of skin; this remedy will at least answer the purpose for some time. To make the operation more effectual, a portion of the orbicularis should be removed, that a firm cicatrix may be produced; or the acid may be employed, using it more freely, so that its action may extend deeper, and a solid scar be the result. If the entropium should be again produced, other means must be resorted to. A mode of operating has been recommended by Mr. CRAMPTON,[*] of Dublin, and followed with a little modification by Mr. GUTHRIE;[†] it consists in a perpendicular division of the lid near to each angle, or on each side of the inverted portion, cutting through its textures longitudinally, when it may be turned up and brought into a state of complete eversion. The whole thickness of the lid is cut through by a strong pair of scissars, so that when you lift it, the mucous or concave surface is fully exposed. The contracted ciliary margin being thus set at liberty, the inversion is remedied at the moment, but in bad cases the tarsus still remains a little bent inwards. A portion of the external skin must be cut out, as in the operation already described, taking up the necessary fold with the forceps, measuring it, removing it with the knife or scissars, and then uniting with two small sutures. A little cut, or nick, should then be made in each edge of the curved tarsal cartilage, so that it may more easily bend outwards in its proper direction. Then, having left the threads of the external sutures sufficiently long, carry them upwards, and confine them on the brow by sticking plaster, elevating them sufficiently to evert completely the liberated upper eye-lid, and to maintain it everted, with its mucous surface completely exposed. Thus the parts are to be left till the sutures come through by ulceration, and till the granulation of the two longitudinal cuts draws the lid gradually into its natural position. The inverted lid is to be covered by a piece of thin linen spread with spermaceti cerate. The object of the proceeding is to liberate the contracted tarsus, to destroy its unnatural curvature, and thus to prevent renewed inversions. Mr. GUTHRIE represents that it accomplishes these points completely; that it is a perfect remedy for the severe sufferings caused by habitual entropium. I have not employed the proceeding often enough to give a decided opinion on it, grounded on my own experience. But, from what I have hitherto seen, I prefer to this rather complicated proceeding, in which great liberties are taken with the part, another and more simple plan, which is certainly effectual in removing the immediate cause of evil, viz. the irritation caused by the inverted cilia. This is the *excision* of the inverted cilia with that portion of the edge of the lid containing their bulbs, proposed by professor Jaeger,[*] of Vienna. In a case of complete inversion, it is exceedingly difficult, if not impossible, to accomplish a perfect cure; that is, to restore the edge of the lid, with its lashes, to its natural state; the excision of the bulbs sacrifices the lashes, but has the advantage of removing effectually all source of irritation from the eye.

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[*] *Essay on the entropion*, London, 1806.

[†] *Lectures on the operative surgery of the eye*, 1823, p. 31—41.

A smooth slightly concave piece of horn, adapted to the size of the lid, is introduced under it as a means of extension and support in the operation. A horizontal incision is then carried through the skin and orbicularis, a line and a half from the ciliary margin, and continued to that margin at each extremity of the inverted portion. The part thus marked out is to be dissected carefully off by repeated short strokes of the knife carried obliquely, so as to include the bulbs of the inverted lashes, and leave the mucous surface entire. As the integument is redundant, it may sometimes be advantageous to make the first incision further from the margin of the lid than I have mentioned; but, in the subsequent dissection, we must not remove more than a line and a half, which will include the complete ciliary bulbs. The portion to be removed may be held and drawn outwards with forceps; or, it may be more completely and conveniently commanded by means of a ligature passed under the skin with a curved needle. A soft rag dipped in cold water may be laid on the eye after the operation, and occasionally renewed. I have adopted this mode of proceeding in many instances with a completely satisfactory result.

The excision of the whole tarsus, proposed by Mr. Saunders[†] is an unnecessarily extensive and severe measure, and is now, I believe, entirely abandoned. Dr. Jacob[‡] cuts away the cilia and their bulbs with scissars, making repeated small incisions until the whole of the inverted portion is removed.

Trichiasis.—The word *trichiasis* denotes an unnatural direction of the cilia, in which they turn inwards against the eye-ball. It generally attends entropium, but not necessarily so; for the lid, when inverted, sometimes forms a roll, the interior of which is occupied by the lashes. On the other hand, the lid retaining its natural direction and position, one or more of the cilia may be turned in so as to press against the globe of the eye. This wrong direction of the cilia is called *trichiasis*, which is a term derived from the Greek word for hair. The changes, which the form and direction of the ciliary margin undergo in the worst forms of entropium, cause trichiasis, which is then combined with the inversion. Cicatrices of the ciliary margin, or tarsal surface of the lid, will cause partial trichiasis; thus it happens after wounds, injuries from caustic substances, or ulceration from various causes. The trichiasis may be complete, involving the whole row of eye-lashes; there may be only a single hair; or it may exist in any intermediate degree. I have seen patients in whom the entire series in both lids of both eyes has been inverted; so that they have not only been deprived of all useful vision, but rendered miserable by inflammation and pain for many years. When the form of the ciliary margin has been altered by long continued disease, the cilia, instead of projecting nearly horizontally, are placed almost perpendicularly, so that their convexity brushes against the globe. Their points are directed towards the eye, when the inversion proceeds further. Sometimes one or two hairs are inverted without any apparent cause, the lid and the other cilia being quite natural; in this case the wrongly directed hair is usually very slender and light coloured, so that close examination is necessary to detect the cause of inconvenience. The sensations of the patient, however, are very accurate; the feeling of a foreign body rubbing the eye is almost invariably expressed. This mechanical irritation of the organ produces different effects according to its degree, and other circumstances. Sometimes there is a slight uneasiness without inflammation; and this may exist for a long time without the cause being discovered when there is only a single inverted lash. Inflammation may be caused in the highest degree, with ulceration and opacity of the cornea, and the severest pain of the organ, with intolerance of light and the greatest irritability. Sight may be destroyed by the effects of repeated acute inflammation in the cornea, but the patient's sufferings are not at an end; they are only alleviated by keeping the eye absolutely at rest; the motion required in using it renews the pain.

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[*] Hosp, *diss. med. chir. sistens diagnosin, et curam radicalem trichiasis, distichiasis necnon entropii*, Viennæ; also in Radius, *script. ophthalm. minor*, vol. i.

[†] *On the cure of the inversion of the upper eye-lid by excision of the tarsus*, in his posthumous work, p. 74.

[‡] *Dublin Hospital reports*, vol. v. p. 392.

Treatment.—The cure of trichiasis is either palliative or radical. The former consists in plucking out the cilia; for which purpose we use forceps with broad ends. The lashes soon grow again, and must be extracted as often as they are reproduced. If the case requires a more effectual remedy, we must have recourse to the operation of extirpating the bulbs of the inverted cilia, as described for entropium.

There is a modification of the affection, called *distichiasis*, a Greek word meaning double row; not that there is properly a double row, but there is a partial series of cilia produced on the inner margin of the lid, in addition to the natural row.

These pseudo-cilia, which are produced not unfrequently where the lids have long been the seat of irritation, generally turn in against the globe. The palliative measure of eradication must be adopted; its frequent repetition in this, as in other cases, sometimes proves a radical remedy.

A triangular portion of the eye-lid has been removed in the case of a small partial trichiasis. I have found excision of the bulbs a sufficient remedy in similar instances.

SECTION IV.—MORBID CONNEXIONS.

Ancyloblepharon is a preternatural union of the two lids. They have been found thus united in some instances, as a congenital malformation; but I have not seen such an occurrence.* It is usually the result of ulceration: if the opposed margins are both ulcerated at the same time, they may grow together. In this way partial union may be produced at the external angle, in old cases of lippitudo, where there have been frequent inflammation and excoriation, shortening the palpebral slit, and inconvenient in the operation of extraction, by preventing a sufficient exposure of the globe. This state cannot be remedied; indeed, I never saw it existing to a degree requiring any remedy. If there were congenital union of the lids, as we sometimes find in the anus and labia pudendi, with no other defect, they ought to be separated by incision, taking the necessary care not to wound the globe.

The term *symblepharon* denotes a connexion of the lid to the globe of the eye. This is generally the consequence of accidents, in which caustic substances, such as lime or mortar, are brought into contact with the surfaces of the lid and the globe; it may take place whenever ulceration of the two opposed conjunctival surfaces is produced, from whatever cause. The granulations, which shoot up from the globe and lid, inosculate, and a permanent adhesion is produced. When the surfaces are extensive, it is impossible to prevent their accretion, even if we see the case from the beginning; at least I failed completely in a case where the lower lid and globe were thus injured by mortar, and where I took every pains to prevent the parts growing together. The accretion varies in extent and firmness; there may be a close and firm union of the entire lid and globe, or merely slender and loose bridles of connexion; or any intermediate degree between these. The slender fræna may be divided and dissected off, if there be any useful purpose to be accomplished; and there would be no difficulty in separating the more extensive and close connexion; but the constant apposition of the raw surfaces reproduces the union, so that the inconvenience may be considered irremediable.*

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* BEER says, that the very rare affection, congenital ancyloblepharon, had come under his observation, and that he had operated both with and without successful result. *Lehre*, vol. ii. p. 123, note.

Epicanthus.—The present seems the only convenient opportunity for mentioning a congenital peculiarity of structure, which I have seen a few times in infants, consisting of a fold of skin at the side of the nose, projecting from one to two lines, covering the internal canthus, and apparently limiting the separation of the lids. The prominent edge of the fold is nearly perpendicular, or it may be a very little concave. The effect on the movement of the lids has not been sufficient in the cases I have seen to require remedy by operation. Professor Ammon,† who has described the case under the name of *epicanthus*, has proposed an operation for it; and Graefe ‡ seems also to have operated in a case.

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* In a case of total symblepharon of both eyes from ill-treated catarrhal blennorrhœa, Beer separated the lids from the globes, and found the latter natural, excepting opacity of the cornea. The adhesion was partially renewed while Dr. Juengken, who mentions the case in a letter, had the opportunity of seeing the patient.—Graefe und Walther's *Journal*, vol. i. p. 521.

"Quant à l'adhérence des paupières au globe," says Demours, "je l'ai vu plusieurs fois plutôt augmentée que diminuée, après une opération tentée pour la détruire." "Au rapport de M. Richerand, M. Boyer a vu trois fois cette adhérence se renouveler."—*Traité des maladies des yeux*, tom. i. p. 113.

† *Zeitschrift*, vol. i. No. 34, plate 5.

‡ *Ibid.* vol. ii. No. 4, plate 1, fig. 8.

SECTION V.—TUMOURS.

There is a great variety of these, some of them being analogous to what we meet with in other parts, while others are peculiar to this situation.

Nævi materni occur not unfrequently on the eye-brow or upper lid. In a large one occupying the latter situation, the employment of the knife would be inadmissible, not only on account of dangerous hemorrhage, but also because the cicatrisation of the wound might cause shortening or eversion of the lid. In such a case I lately employed the ligature with perfect success; the basis of the growth was so large, that I found it necessary to tie it in three portions. In an infant of six months, there was a subcutaneous nævus as large as a filbert, occupying the inner half of the upper lid, and its entire thickness. It formed on the conjunctival surface a soft purple prominence, marked by superficial sulci. Through the centre of this growth I passed a seton, which was followed by profuse arterial hemorrhage: pressure soon stopped it. The increase of the nævus was arrested; but when the patient left town, five or six weeks after the operation, its size was not diminished.

Encysted tumours sometimes occur in the neighbourhood of the palpebræ. They may be situated immediately under the skin, external to the orbicularis, or under the muscles. In the latter case, they may adhere to and make an impression on the external angular process of the frontal bone. In many cases I have seen reason to conclude that they were congenital. They must be removed, if they are large enough to be conspicuous, and should be increasing. In operating we must attend to the direction of the incision in the integuments, with a view to lessen subsequent deformity. I have seen individuals in whom the tumours have not increased for many years, and I therefore should not advise their removal unless they are found to increase in size. Females generally wish to have such tumours removed, considering them a blemish. The cyst has generally contained fatty matter and hair.

The lids are subject to the formation of tumours, which may be called half-encysted, containing a white milky matter. They appear first as a small smooth wart, with a flattened surface, and a small pin-hole in its centre; they gradually increase in size to that of a pea, a horsebean, or the end of the finger. Pressure will squeeze out a little soft white matter from the central opening. They sometimes inflame; the aperture enlarges, and the cavity of the cyst is exposed, as an irregular fibrous surface, producing a copious discharge, with surrounding inflammation and excoriation. There is generally more than one, and often they are numerous in both lids; they are also seen in other parts of the face, but less frequently. The easiest mode of removing them is to split them in two with a small sharp knife; we may then with a forceps take hold of the divided halves, and pull them gently out; very little force is sufficient to separate the loose cellular adhesions of the tumour to the surrounding parts. The tumour is lobulated on the surface, soft and whitish, and has a small cavity in the centre. In this mode of proceeding, no skin is removed. Lay a soft rag dipped in cold water over the eye, and keep it damp; the part heals readily, and no mark is left. If it should have begun to ulcerate, it will be sufficient to take a caustic pencil and touch the exposed surface; the tumour then drops out in a day or two. Sometimes it is spontaneously detached under the inflammatory action, and the surface heals.

Tarsal tumours.—These, which are of frequent occurrence, grow from the tarsus, to which they firmly adhere, and form small external swellings, sometimes reddish coloured, on the lids. They are covered externally by the integuments and the fibres of the orbicularis. They seldom grow larger than a pea or bean, and do not give much trouble, except producing a sense of heaviness in the lid. By inverting the lid, more particularly the upper, the part of the tarsus from which the tumour rises may be distinctly seen: the cartilage is rendered thin at that part, so as to show the size and situation of the base of the tumour. The contents are various; sometimes there is obvious redness, and the production is inflammatory; pus is contained, and the case may be considered as chronic abscess of the lid. Sometimes there is a glairy fluid; sometimes a soft vascular tissue breaking down under the probe. The general rule given for operating on tumours of the lids, is to cut down through the skin and orbicularis, and dissect them out. This is a painful operation, and cannot be strictly executed, as you cannot insulate the basis from the tarsus; if you were to separate the tumour entire, you must cut through the cartilage, and thus make a button-hole in the lid. However, this external incision and dissection are unnecessary; it is sufficient to invert the lid, and to puncture the thinned portion of the tarsus, with a sharp-pointed double-edged knife: the pus, glairy fluid, or whatever else it may contain, escapes; nothing more is necessary, the cavity contracts, and the place soon heals. Supposing the tumour not to contain fluid, but to be of a vascular texture, then a second incision should be made at an acute angle to the former, so that a little triangular flap is produced, which may be cut out with the scissars; then break down the soft texture with a probe. In a few days a soft kind of fungus projects, which we cut off with the scissars, and the part heals.

Tumours sometimes form upon the inner surface of the eyelid, just at its orbital edge, where they are merely covered by the conjunctiva. If we invert the lid, we can remove them very easily, transfixing them with a hook and drawing them out. It is better to do these little operations on the inside than on the outside, if we can; there is less to be cut through, and less risk of an unpleasant scar.

An indurated tumour of undefined margin, occupying the edge of the lid, is described under the name of *chalasion*, or *grando*, which are the Greek and Latin terms for hail: the Germans give it the corresponding name of *hagelkorn*. It is said to be the indurated remains of a stye, which has not suppurated regularly: hence it has been called *hordeolum induratum*. BEER's chapter[*] on this subject is a most unfortunate specimen of pathology and treatment. He says, that this indurated stye may assume a scirrhous character in scrofulous subjects, and that if such persons should become affected by any other kind of dyscrasia or cachexia, such as syphilis, itch, gout, scurvy, the complaint may go on to carcinomatous ulceration. ROSAS[†] gives a similar representation. If the complaint should not be removed by the farrago of treatment recommended, extirpation is advised. I have never seen the remains of a stye become troublesome, nor found it necessary to cut away such substances as those described by the name of grando. I am quite at a loss to account for the strange notion that hordeola may be metamorphosed into scirrhus and cancer.

Milium and Phlyctenula.—Small white tumours are sometimes seen on the margin of the lids. They are about equal to the head of a large pin, or they may be rather larger.

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[*] *Lehre*, vol. ii. p. 139.

[†] *Handbuch*; vol. ii. § 209. Jüngken states that cancer of the eye-lids may arise from chalasion or warts badly treated.—*Handbuch*, p. 603.

They consist of a thin but dense membrane, containing a soft substance nearly like boiled rice. These are called *milia*. They cause no inconvenience, when they remain stationary, and attain only a limited size; they generally occur in elderly persons. If their appearance is disliked, they are easily removed by transfixing them with a hook, and cutting them out with scissars. The same observations are applicable to watery vesicles of the ciliary margin *(phlyctenula.)* I have seen the edges of both lids on each side studded with a mixture of these milia and phlyctenulæ without any inconvenience to the individual. Warts may form on the edge of the eye-lid. If they are troublesome, they may be snipped off with scissars.

CHAPTER XX.

AFFECTIONS OF THE CONJUNCTIVA.

The thickened and granulated state of the membrane has been noticed in the accounts of catarrhal and purulent ophthalmia. (See pages 158 and 213.)

Ulcers.—The elevations of the membrane called pustules frequently ulcerate, forming small sores, which soon heal. Syphilitic ulceration of the conjunctiva has been described in the preceding chapter.

I have seen a few instances of conjunctival ulceration not referable to any specific cause. A gentleman, about thirty years of age, of good constitution, consulted me, a year ago, for inflammation of one eye. It was a smart attack of external ophthalmia. I found an ulcer, with whitish surface, about three-quarters of an inch long,and one-quarter wide, on the conjunctiva scleroticæ, below the cornea. The history and circumstances of the case afforded no explanation of the appearance. It was necessary to take blood by cupping and leeches: the inflammation was soon removed, and the ulcer healed quickly. In the case of another young man, more severe and obstinate external ophthalmia existed in conjunction with ulcer of the conjunctiva.

Encanthis.—Enlargement of the caruncula lacrymalis is described under this name. Two species of it are mentioned, the innocent and them alignant. Long descriptions, and directions for treatment by applications and operations, will be found in Treatises on Diseases of the Eye. Having never seen an enlarged caruncula requiring excision, or any other surgical process, I conclude that the case must be rare. I am equally unacquainted with malignant encanthis. If the part, in an inflamed state, were treated by the stimuli which have been so liberally used in many forms of ophthalmic inflammation, an affection originally innocent might assume what is called a malignant character. The remedy for this surgical malignity is obvious.

Dry conjunctiva.—I have seen, in two or three instances, a very singular state of the membrane, which it is necessary to mention, although I can offer nothing satisfactory on the pathology or treatment. The conjunctiva loses its character of a mucous membrane, and no longer secretes; the eye becomes completely dry, and has a rough appearance; the cornea looks dry and dusky, the lids gradually adhere to the globe of the eye, producing symblepharon. I have seen it in young subjects, and could not obtain from them any clear account of its history, nor render any service by medical or surgical treatment; indeed, in the few instances under my own observation, the affection had been of long standing, and the alterations in the organ so considerable as to make all curative efforts hopeless.*

The conjunctiva sometimes acquires a livid or olive tint in persons who have long employed the nitrate of silver locally; and, as far as I know, the change of colour is permanent. The long-continued internal use of the same remedy produces a similar effect on the integuments generally, giving them a dirty appearance, with a livid or bronzed tint; and this change seems permanent.

Dr. Jacob of Dublin, who has observed and described this change of colour in the conjunctiva, has remarked, as I have found, that it is owing, not to the strength, but to the long-continued employment of the caustic solution. He considers it analogous to the effect of colouring matters on the skin, in tattooing, and, consequently, as an additional proof of the identity of the two structures.†

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* Two cases of this uncommon disease are detailed by Professor Ammon, under the name of *Xerosis conjunctivæ*; *Zeitschrift*, vol. i. No. 6. The first figure in the seventh plate of Mr. Wardrop's Essays, vol. i., represents very well the dry, dead appearance of the eye.

† *Dublin Hospital Reports*, vol. v. p. 366, plate 1, fig. 1.

Pterygium.—An affection of the conjunctiva is so called, from a Greek word meaning a wing, the name being probably given from the triangular shape of the affected portion. It is a thickened state of the membrane, with some increased redness, and enlargement of some vessels. It forms slowly, and is situated generally at one of the angles, the base of the triangle being toward the circumference of the globe, and the apex towards the cornea, generally advancing upon it. The thickening and vascularity of the membrane are greatest at the base, that is, on the sclerotica, where the conjunctiva is loose; it is thinner on the cornea, where the density of the membrane affords a greater resistance to the change: this difference explains the triangular wing-like figure which the disease always assumes, and constantly preserves, as the apex slowly makes its way towards the centre of the cornea. It appears more frequently in the internal than the external angle, and seems to proceed from the semilunar fold of the conjunctiva; at least the thick base of the pterygium is connected to this part. It not uncommonly appears, at the same time, in both angles, and frequently in both eyes. Occasionally, but more rarely, it is seen at the middle of the upper or lower part of the globe, or in both situations at the same time.

It comes on quite insensibly, and grows very slowly; the patient experiences no uneasiness, and is not aware of its existence, till it has made some progress; we cannot, therefore, ascribe its origin to inflammation of the membrane, nor perhaps, with strict propriety, class it among the consequences of inflammation. I have seen it most frequently in persons who had passed much time in hot climates, as in the East or West Indies. The pterygium is loosely connected to the sclerotica and cornea; we can elevate it from the globe, and it projects above the general surface of the conjunctiva, as if it were an adventitious growth. The texture of the membrane is not simply thickened; it assumes a fibrous aspect, which is often strongly marked, so as to produce a tendinous appearance.

Pterygium presents itself under various forms, which have received different appellations. *Pterygium tenue*, or thin pterygium, is a slight and often very delicate fibrous and vascular layer, through which we can see the transparent cornea. We may have the growth more thick and compact, like a tough dense membrane, but still with more or less of fibrous character; it forms a thick and perfectly opaque layer on the cornea, becoming thinner on its sides and apex; this is the *pterygium crassum*, thick or fleshy pterygium. A malignant or cancerous pterygium has also been mentioned. I have never seen such an affection, and the appearances which have given rise to the description, have probably arisen merely from the injudicious use of stimulating and escharotic substances to ordinary pterygia.

A distinguishing character of this affection is its slow progress; it will last many years without making much advance. However, it gradually proceeds towards the centre of the cornea, and it may thus ultimately interfere with vision, especially if there should be one on each side of the eye. I have seen many instances in which it has been apparently stationary for years; it has appeared at the middle period of life, and not grown so as to require any surgical treatment.

So long as it remains in the quiet state I have described, and neither interferes, nor seems likely to interfere, with sight, it should be left alone. Its growth may be accelerated, but cannot be retarded by stimuli. If it should advance upon the cornea, so as to impede vision, or should threaten such an impediment, it must be removed. The morbid growth may be easily cut away either with a knife or scissars. Seize it with a pair of forceps, elevate it, pass a cataract knife, with its flat surface towards the globe, under it; then, carrying the knife horizontally forwards, shave the thickened membrane from the cornea, afterwards detach the basis, elevating the growth with the forceps, and cutting it away completely from its origin, either with the knife or scissars. The surface heals up, and you would not think of irritating it by any stimulating applications. This proceeding is applicable either to the thin, or to the fleshy pterygium. I mentioned before that I never saw a case of the malignant kind; but I think, that if common pterygia were treated in the mode which has been sometimes advised, they might not improbably put on the unfavourable characters, which have been ascribed to an originally dangerous nature of the affection.

Pterygium pingue, or *pinguecula*, which occurs in elderly persons, consists of a few little yellow granules toward the angles of the eye, under the conjunctiva. It is not a disease, nor is it necessary to remove this little deposit of fat, unless the person should dislike the appearance. I never saw it proceed to a degree requiring an operation from any inconvenience to the patient.

I have seen small polypi, analogous to those of the Schneiderian membrane, growing from the conjunctiva. Vascular warts are occasionally met with. Excision is necessary in both cases.

I met with a tumor, growing from the tarsal surface of the upper eye-lid, equal in size to a large pea, and connected by a slender stalk. It had a smooth mucous surface, and I considered it to be polypus. In snipping it off, I found the peduncle hard, so as to require some force in dividing it. It was found to be fibro-cartilaginous and thoroughly hard internally, conjunctival externally: it had probably grown from the tarsus, to the orbital edge of which it had been attached. The complaint had existed fifteen years, and had caused trichiasis of one quarter of the upper eye-lid.

Mr. WARDROP* has described and delineated a considerably thickened state of the conjunctiva, under the name of fleshy pterygium, also a brown tumour and a warty excrescence of the corneal conjunctiva, and a tumour of the membrane, with hair growing from it. The affection in the latter case was congenital, as well as in that of another tumour, partly seated on the cornea, partly on the sclerotica. I have seen examples of the latter kind; that is, soft white masses, apparently consisting of thickened conjunctiva seated on the boundary, between it and the cornea, existing at the time of birth, and not increasing so as to require surgical treatment.

CHAPTER XXI.

AFFECTIONS OF THE CORNEA AND CHAMBERS OF THE AQUEUS HUMOR.

Vascularity.—The nutrient vessels of the cornea become enlarged in disease, so as to convey red blood, the state thus produced being called vascularity of the cornea. The enlarged vessels may be those of the conjunctival layer, and consequently superficial; or those of the corneal laminæ, and deep-seated. A few vessels or fasciculi may be visible, or the whole texture may be reddened by a countless multitude of ramifications. The latter state, occurring on the surface, with thickening of the conjunctival layer, is called *pannus*. This unnatural vascularity may result from the direct excitement of active inflammation; or, which is more frequent, as the slow consequence of chronic irritation. The change in question is described among the effects of common external inflammation, (CHAPTER III.,) of purulent and strumous ophthalmia, (CHAPTERS IX. and XII.,) and of inflammation of the cornea. (CHAPTER XIV.) The enlarged vessels contract under the influence of the means, by which inflammation is reduced, which have been already sufficiently explained. The only question which remains for consideration is, whether the effect of such means can be assisted by the operation of dividing the vessels; for example, by cutting out a piece of the conjunctiva round the margin of the cornea in pannus. The deep-seated vessels of the corneal laminæ cannot be divided; the proceeding, therefore, could only be beneficial where the enlargement is confined to those of the mucous surface. I have seen no decided benefit from it; but there can be no objection to trying it in a suitable case, which remains unrelieved by a sufficient perseverance in other measures. Suppuration of the cornea is described in CHAPTERS III. and X.; sloughing in CHAPTERS VIII. and X.

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* *Essays on the Morbid Anatomy of the Human Eye*, vol. i. chap. iv. plates 3 and 4.

Ulceration.—In its natural structure, consisting of cartilaginous laminæ, and mucous membrane, the cornea is analogous to the articular ends of bones, in which the dense cartilage is covered by synovial membrane. Both are very liable to ulceration, and the process in both exhibits this peculiarity, that no granulations are seen, and no pus is formed. It appears as a simple process of absorption. Ulcers of the cornea occur frequently in inflammation of the external tunics, in the purulent and strumous ophthalmiæ; and I have described their phenomena, progress, and effects, in the chapters on those subjects. Here, as in other instances, the ulcer is the consequence of inflammation; we should invert the order of occurrences, if we represented the latter as produced by the irritation of the former. It is not necessary to adopt any local treatment merely in reference to the ulcer. The ordinary treatment must be employed for the inflammation. When that is removed, the ulcers will heal. The notion that they require the application of lunar caustic has prevailed very generally, and led to injurious practice. The employment of this remedy must be determined by other considerations, without any reference to the existence or non-existence of ulcer. Dr. JACOB says, that the caustic sometimes becomes permanently fixed, and constitutes an indelible dark speck.* I have not seen this occurrence; but, generally speaking, I have found corneal ulcers to heal most rapidly under antiphlogistic treatment, and without the use of local stimuli or astringents.

I have found cases of corneal ulceration peculiarly obstinate and intractable, when the surface of the ulcer has presented, generally or partially, an opaque white colour, as if it had been covered by wetted chalk, the attendant ophthalmia not being considerable. Sometimes such ulcers have continued for weeks or months, in spite of every treatment. I do not know what the peculiarity depends on; but Dr. JACOB ascribes it to the application of the acetate of lead, which, he says, "is decomposed, and a white precipitate is deposited in the ulcer, to which it adheres tenaciously, and in the healing becomes permanently and indelibly imbedded in the structure of the cornea."†

In obstinate cases of chronic ulceration, which, with little inflammation, will sometimes creep slowly over the cornea, healing on one side, while it advances on the other, I have found great benefit from issue in the temple.

The appearance called *hernia corneæ*, or *ceratocele*, sometimes attendant on ulceration of the part, has been noticed in the description of gonorrhœal ophthalmia, at page 222. The hernial protrusion of the membrane of the aqueus humor forms a transparent vesicle in the bottom of the corneal ulcer; this rises or protrudes when the muscles of the globe act, and subsides when that action ceases.

Opacities.—The edge of the cornea frequently loses its transparency, throughout the whole, or in a part of its circumference, in elderly persons, at least in those past the middle period of life; and the opaque circle, or half-circle, thus formed, is called *arcus senilis*, or *gerontoxon*. The change comes on without any redness, pain, uneasiness, or the slightest impediment of function, and proceeds at length to render the cornea, in the part which it occupies, entirely impervious to light. The opaque circle is not situated at the very margin of the cornea; there is generally a comparatively transparent rim between it and the sclerotic coat. In some cases the opacity is very narrow, in others much broader; but I have never seen it interfere with vision. Although it has occupied a considerable portion of the cornea, enough of the central part has been left clear for the transmission of light. The colour is greyish white, the tint being deeper towards the circumference, and gradually shaded off towards the centre of the cornea. Often it occurs on the lower half only; and sometimes it exists only in one eye, or is more considerable in one than in the other. It occurs much earlier in some individuals than in others, being occasionally seen between thirty and forty, but usually not until after the latter age. No essential difference has been found in the structure of the part;[*] there is no new growth, nor any deficiency of its usual density. I can only compare it to the change which takes place in the internal coat of the larger arteries in old persons. We see opaque spots and patches in the internal membrane of those vessels, although no disease has been apparent during life. In the same way this opacity of the cornea occurs without any evidence of disease, but merely as a change incidental to advancing age; hence BEER would call it *marasmus senilis corneæ.* A puncture or incision in the arcus senilis heals just as if the part were transparent. In the dissection of eyes affected with arcus senilis, a corresponding opaque change has been found in the circumference of the lens or capsule, more frequently of the latter. When the lower half only of the cornea has been affected, the internal opacity has been confined to the inferior portion of the lens or capsule.[†]

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* *Ibid*. p. 367.

† *Ibid*. p. 369.

Opacities of the cornea are generally the result of disease, being produced by inflammation. New matter is deposited during inflammation, and becomes organized, thus causing the opaque change. Therefore when we see opacity, we infer that inflammation has preceded; and, generally speaking, the intensity of the opacity is in proportion to the violence of the preceding inflammation. This is not necessarily the case, as certain inflammations of the cornea are characterized rather by the deposition of new matter, than by considerable vascular congestion; so that considerable opacity may be produced without violent external inflammation of the eye.

The term opacity is a very general one, including all the changes which affect the transparency of the cornea, from a

[*] "I have often," says Dr. SCHÖN of Hamburg, "examined anatomically corneæ affected with arcus senilis, and found the affected portion changed into a homogeneous, sometimes fat-like (speckartige) mass, often of considerable firmness. The laminated structure had entirely disappeared, the laminæ being consolidated into one mass; this was more particularly the case with the external than the internal laminæ. I never found any alteration in the neighbouring portion of the sclerotica. When the opacity has been inconsiderable, it has been confined to the conjunctival layer."—AMMON'S *Zeitschrift*, vol. i. p. 162.

[†] *Ueber den marasmus senilis der Kapsel und Linse im menschlichen auge*, von Dr. M. S. A. SCHÖN; in AMMON'S *Zeitschrift*, vol. i. No. 10.

difficultly perceptible film to the most intense whiteness, like that of marble or chalk. Opacity in its slighter form is called *nebula*, haziness, or dulness; there is a milky, cloudy, or smoky appearance of the part; a state in which the transmission of light is only partially impeded. The more dense opacities extending through the laminæ, are called *leucoma*, or *albugo*. The term *macula* is applied to small patches or specks. The popular word for opacity is *film*. The colour of the opaque part is different in different instances; generally speaking, it is bluish white like milk, or grey; it may be pearly or silvery, even with a metallic lustre. It may be a dense white, like that of marble; there is sometimes a yellowish, and occasionally a reddish tint. The slightest opacity opposite the pupil will interfere with vision very materially, while the most dense leucoma near the circumference is uninjurious to sight.

Treatment.—Opacity may be confined to the external or mucous layer; it may be seated in the cartilaginous laminæ, or in the internal serous surface of the part; or it may extend through the whole texture. The former is the most favourable case; the latter the least so. When the corneal laminæ are affected throughout, we cannot do much good. Our first object, where inflammation is present, is to put a stop to it. If we do this, and wait a little, we shall find that the opacity will diminish of itself, the newly deposited matter being absorbed, as inflammatory tumefaction subsides in other parts of the body. In children, the processes of nutrition and absorption are vigorous; there is an active interchange of the component parts of the body, and in them the changes which the cornea undergoes, are very striking; although the cornea of a child should be so opaque as to render the iris invisible, it will completely recover its transparency, as in the cases related at pages 174, 175. After reducing the inflammation, and removing from the eye all irritation, after waiting to see what can be done by the natural process of absorption, we may adopt further measures for lessening the opacity. The effect of counter irritation by issue, or seton in the temple, with attention to diet, and to the state of the stomach and bowels, will often be very considerable. The absorption of the newly-deposited matter may be assisted, after these means have been put in force, by the employment of stimulants or astringents; the best of which is a solution of the nitrate of silver, commencing with gr. ii. to the ounce of water, and gradually increased in strength. This may either be dropped into the eye, or applied to the opaque part by means of a camel-hair brush. When red vessels are seen proceeding to the opaque part, their division has been recommended. It cannot be of any service.

Some forms of opacity may be remedied, others not. I shall mention first such cases as admit of recovery. A general dulness or haziness, and sometimes a thin nebula of the cornea occur in iritis, and other internal inflammations of the eye; the change appears diffused through its whole texture. Often a more or less thick film covers the cornea in the purulent ophthalmia of infants, the conjunctival layer being thickened and loosened by the inflammation; the cornea assumes a pale greyish colour, and this appearance sometimes extends over the whole surface. A general nebulous or more opaque state of the cornea is produced in *corneitis*. There is also nebulous opacity, often accompanied with some redness, in strumous ophthalmia. These four cases present examples of impaired transparency, which admit of complete relief; and in all of them, although the opacity should be considerable, it may be removed by the treatment just pointed out. Indeed, it is sufficient in these cases to arrest the inflammation which has caused the opaque change, and the latter will disappear of itself. In the first, and the two last instances, there is general disturbance of the corneal circulation, and interstitial deposition; in the second, the mucous layer alone is the seat of change. The dotted opacity caused by inflammation of the membrane of the aqueus humor also disappears, when the inflammation has been arrested. (See CHAPTER XV. pp. 275, 276.)

Another and a denser kind of opacity arises from inflammation of a more serious character. The change affects the surface and the corneal laminæ more or less deeply: it is interstitial deposition under considerable inflammation of the corneal texture. It may exist in various degrees, from the slight cloudy appearance of a nebula, properly so called, to the most dense form of leucoma; in the first we find that the change of structure is confined to the external lamellæ of the cornea, whilst in the more dense forms the whole thickness of the part has been altered in structure. These white and dense opacities may be diminished, but we cannot remove the whole of the opaque spot. They may be occasioned by an escharotic, such as lime, applied to the surface of the cornea, or by the effusion of matter, when suppuration has taken place. In the latter case, the opacity has at first a yellowish, and subsequently a light brownish tint. These are opacities which admit of partial relief, but not of complete cure.

The third description, which does not admit of cure, is the firm white shining cicatrix of wounds or ulcers. When an ulcer has extended into the corneal laminæ, the cicatrix is a permanent white mark; but if it should be superficial merely, like an excoriation, it may leave no trace. A cicatrix is distinguished by its sharply defined margin, and shining appearance: the edge of an opacity produced by an interstitial deposit is gradually shaded off. In the dense opacity of the entire texture called leucoma, the organization is so much changed, that we can do no good by any treatment as respects the state of the cornea. It will depend upon the situation of the leucoma whether the case may be relieved by the operation for artificial pupil or by the use of belladonna.

Staphyloma.—The cornea is subject to changes in figure as well as to the alterations of texture, which affect its transparency. The term *staphyloma* denotes an increase in the size of the cornea, almost invariably accompanied by more or less opacity; it is derived from the Greek word σταφυλη, which signifies a grape. The term was originally applied to that projection of the cornea, in which its texture, having been weakened by alteration of structure consequent on the inflammatory process, yields to the pressure of the fluids contained in the posterior chamber, and is elevated into a rounded prominence on the front of the eye, the iris being adherent to its internal surface, and stretched out so as to afford it a thin general lining. The term has since been applied more extensively, having been given to other tumours of the front of the eye, and even to expansions of the coats in other directions. In order that the state of staphyloma should be produced, there must be severe inflammation of the eye, involving the entire cornea, and rendering its texture opaque; that inflammation must also have extended to the iris, and caused it to adhere to the cornea; and there must be increased secretion of the aqueus humor to push these unnaturally connected structures forwards. The cornea protrudes to a greater or less extent upon the anterior surface of the organ; the eye remains irritable, and is subject to frequent relapses of inflammation; the prominence of the cornea increases, and after a time its irregular and unusual pressure against the lids, causes pain and inconvenience, while on the other hand, it is often mechanically irritated by the edges of the palpebræ and the cilia. Thus, in addition to the deformity of a mishapen opaque eye, frequent attacks of inflammation are produced. After a certain time the globe remains stationary, and the only inconvenience to the patient is from its bulk. This irritation often has a sympathetic influence on the other eye, rendering it weak and irritable, and preventing the patient from using it freely in reading, writing, or other similar occupations.

Cause.—Staphyloma, then, originates in severe inflammation of the organ; but it arises more particularly from severe external inflammation attended with sloughing, suppuration, or considerable ulceration of the cornea. The texture of the latter, weakened by these processes, gives way to distending causes acting from within; and the staphylomatous tumour in such cases will be more or less irregular in figure. Purulent, gonorrhœal, and variolous ophthalmia are the most frequent causes of staphyloma. Common external inflammation may produce it, as may strumous inflammation; it may also occur as a consequence of iritis.

Treatment.—The treatment is either palliative or radical. The palliative treatment consists in removing the inflammation, which may accompany the affection, by antiphlogistic treatment; or, in diminishing the volume of the swelling, by puncturing the cornea with a cataract needle, and letting out the aqueus humor. Sometimes, by repeated puncturing, the palliative remedy has been converted into a radical cure, the globe shrinking and becoming quiet: however, it will be necessary, if the patient be subject to frequent relapses of inflammation, more especially if these should affect the other eye by sympathy, to resort to the radical treatment. This consists in cutting away the staphylomatous protuberance with a cataract knife. The lids being held asunder by an assistant so as to expose the globe, the operator transfixes the staphyloma with a hook, and removes it at one cut by carrying the knife through its basis from above downwards. Or the knife may be passed through the middle of the basis, then carried upwards, and afterwards turned to divide the lower part. After dividing the upper portion with the knife, in the way described, it may be found more convenient to cut through the lower part with scissars. The effect of this operation is, that the globe shrinks, the coats collapse and form a small tubercle in the orbit, and the lids fall in. It has been advised to pass a curved needle and thread through the tumour, for the purpose of holding it more securely, but the tenaculum or hook is quite sufficient. In separating and fixing the lids, pressure on the globe should be avoided: if all the vitreus humor be squeezed out, the tubercle formed by the tunics after their collapse, may be too small to admit of the adaptation of an artificial eye. The front of the globe in its reduced state, is generally divided into four portions by superficial sulci, corresponding to the insertions of the four recti muscles. The portion of cornea removed is of variable thickness, and its concave surface is lined by the adherent iris. When the first puncture is made into the tumour, the fluid it contains escapes, and that fluid appears to be aqueus humor.

Generally speaking, no serious consequences follow this operation, but severe inflammation sometimes results, as I have seen in two or three instances. This happened in a medical student, in whom staphyloma had occurred from gonorrhœal ophthalmia. He found that he could not pursue his studies in consequence of the irritability of the staphylomatous eye and its influence on the sound one, and he requested that the projection, which was by no means considerable, might be removed. Although he was a person of great firmness, he complained of severe pain on making the division of the parts, and soon after the operation was finished, very acute suffering came on; the conjunctiva covering the part of the globe which remained, and the lining of the lids, became the seat of active inflammation, not distinguishable from the original gonorrhœal ophthalmia. Violent chemosis and purulent discharge came on, with acute pain in the eye and head. He was bled copiously, and other measures of depletion were put in force, although his diet had been low some time before the operation. These means did not diminish the pain, and we were obliged to give opium largely to relieve it; however, the inflammation subsided, and he ultimately did well. I have seen one or two other cases of severe inflammation after the operation, but in general little pain or inconvenience is experienced. SCARPA speaks also of inflammation happening after the removal of the tumour, and he advises the method of CELSUS. The directions of the latter are much like those of more modern practitioners: he advised the removal of the tumour by *deligation* or *excision*. In the former a needle should be carried through the base of the tumour, armed with a double ligature, the ends of which should be tied above and below, so as to embrace the enlarged and protuberant cornea. In the latter case, he says, we should cut away "*magnitudo lenticulæ*," a portion of the size of a lentil seed, and not the whole unnatural prominence. SCARPA recommends that only a small portion of the cornea should be taken away; but I see no good reason for deviating from the ordinary operation of removing the tumour at its base, inasmuch as severe inflammation is an unusual result of the operation, and referable to something in the state of the individual, and not to the kind of operation.

When the globe has shrunk in the socket, we can adapt an *artificial eye* to the prominence which remains, and in this way completely remove the deformity. An artificial eye may be obtained to match exactly the colour of the sound one. The resemblance to the natural appearance is so perfect, that casual observers do not notice the defect. The artificial eye, which is made of enamel, is a concave kind of shell, perfectly smooth on both surfaces. It is introduced by first pushing the upper edge under the upper lid; then by depressing the lower lid, the lower edge of the eye slips into its place. The introduction of this foreign body does not in general produce any irritation of the mucous membrane. Patients can take it out and put it in at pleasure; and they generally remove the eye at night, which is done easily by depressing the lower lid, and raising the lower edge of the eye with a bodkin, or with the end of the nail. When taken out it should be wiped clean. The artificial eye moves in harmony with the natural one, especially from side to side; the motions upwards and downwards are not so well performed. The muscles of the globe are uninjured in these cases, and remain attached to the collapsed tunics; when the eye has shrunk they continue to act in concert with those of the sound organ, moving the remaining tubercle, and the artificial eye which is supported on it.

Staphyloma may be total or partial; the whole of the cornea may be elevated into an unnatural protuberance, (***staphyloma totale***,) or a part only may be affected, (***staphyloma partiale***.) In the total, sight is generally lost; the cornea is more or less opaque, and the axis of the eye is greatly lengthened. If partial staphyloma does not involve the pupil, or if it should engage only a small portion of the aperture, a considerable degree of vision, or even perfect sight, may remain. If it embrace the entire pupil, or be accompanied with general opacity, it destroys sight altogether. If this partial projection of the cornea should occasion great irritation of the lids, or should affect the opposite eye sympathetically, it will be necessary to deal with it as if the staphyloma were total. According to differences in figure, dependent on some variations in the mode of production, staphyloma has been distinguished into the *hemispherical* and *conical*.

The cornea is sometimes expanded in size without losing its transparency, and without the iris being adherent to it. This form of the affection is called *staphyloma pellucidum*, but it ought rather to be placed under the head of hydrops oculi, as it is principally owing to increase of the aqueus humor. The only instances I have seen of this kind have been examples of congenital malformation, and attended with blindness or imperfect vision.

The term staphyloma has been applied to unnatural distensions of the sclerotic coat, (*staphyloma scleroticæ.*) They occur where the internal tunics of the eye have been the seat of considerable inflammation, by which the anterior part of the sclerotic has been made thinner, and consequently so much weakened as to give way partially to the pressure of fluid secreted within the globe, or to that of varicous vessels. Sometimes there is a single large swelling; in other cases we see several smaller elevations. They are especially apt to occur in that part of the sclerotic under which the ciliary body is placed. Staphyloma scleroticæ occurs only when vision has been lost from internal inflammation. In examinations after death, the posterior part of the sclerotica, on the temporal side of the optic nerve, has been found in a staphylomatous state in a few instances, (*staphyloma scleroticæ posterius.*) The name staphyloma has also been applied to protrusions of the iris through openings of the cornea, and to bulgings of the iris within the eye.

Conical cornea.—The cornea is also subject to a change of figure, in which its regular convexity is lost, and it is elevated into a conical protuberance without opacity, pain, or any preceding suffering, and without any visible change in its own texture, or in any other parts of the eye. It becomes conical, and that is all we can observe in the case. This state of the cornea has been called *staphyloma pellucidum conicum;* we generally call it simply conical cornea. This change of figure begins insensibly, proceeds very slowly, and will require several years to reach its full development. When we see a patient labouring under this affection, we are at first struck with a peculiar brilliance or dazzling look of the eye, the light being reflected in an unusual manner from the altered portion of the cornea. When we survey the eye laterally, we see that the cornea does not present its natural convexity; that it is elevated into an obtuse cone, and that it looks as if a piece of fine transparent glass were placed in front of the eye. The cornea remains perfectly transparent, and there is no apparent deviation from its natural structure; the iris and the pupil are natural; the external surface of the eye is perfectly so; in short, there is no other visible alteration but this change of figure in the cornea. In the early period of the complaint, it is difficult to ascertain its existence; after a certain time we notice it from the before-mentioned dazzling reflection of light. The change in the shape of the cornea interrupts the transmission of light; the focus is altered and the patient is rendered myopic, or near-sighted; he brings objects very close to the eye. The near-sightedness becomes more and more considerable as the disease advances, so that at last the patient can only read at about the distance of an inch, and he holds what he has to read towards the side of the eye, not in front of it, the circumference of the cornea being the least altered. When the complaint has gone to the length of elevating the cornea into a decided conical protuberance, which generally occupies some years, it will remain stationary. The friction against the lids sometimes renders the apex of the cone opaque. This change may go on in one eye without the other being affected, and so little inconvenience does it occasion at the commencement, or even after it has made some progress, that the patient only discovers its existence by shutting the sound one, or by some accidental occurrence.

It occurs in young and healthy subjects, in whom there is no constitutional cause to which the local change can be referred. I have seen it in healthy country girls; and it is much more frequent in women than in men. We must suppose it to be a rare affection, as it is not mentioned in the work of Beer; Professor Himly, of Gottingen, had never seen a case of it. I have seen several instances, so that it would not appear, comparatively speaking, to be of unfrequent occurrence in this country. We do not know whether the cornea is thicker or thinner than in the natural state. I have punctured it to evacuate the aqueus humor, but without ascertaining the point. There is an increased secretion of the aqueus humor, and it is supposed from that circumstance that the cornea must be thinner, and that it has yielded in the centre.[*]

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[*] Professor Jaeger of Erlangen, lately examined, after death, an eye, in which the cornea had undergone the conical change of figure. When the cornea was taken between the finger and thumb, a depression towards the middle was plainly perceptible, surrounded by a thick margin. On cutting it through, the middle third was found three times thinner than usual, not thicker than writing-

We cannot, however, suppose that the cornea could be extended by the pressure of increased secretion, without the occurrence of pain or redness, or changes in the state and position of the iris and other internal parts.

If we do not know the cause of the affection, we cannot be prepared to propose any rational treatment. I cannot say that I have seen any plan productive of benefit. During the progress of the complaint, the use of concave glasses will assist sight; and if pain should attend the affection, we must have recourse to such local measures as the state of the organ may seem to point out. The eye should be used sparingly, and blood may be taken locally. A young woman from the country, who laboured under this affection, had some symptoms of congestion in the head, which were relieved by cupping, and the sight was assisted by using concave glasses. Astringent washes have been used without any advantage. An old clergyman, who was the subject of this affection for nearly thirty years, was enabled to continue his duty in the pulpit with tolerable accuracy to the time of his death, which happened when he was about seventy. The apex of the cone had become opaque in his case; the opacity was diminished by the solution of nitrate of silver; and he employed belladonna to enlarge the pupil. It was proposed by Sir William Adams to perform the operation for cataract by solution as a remedy for this affection. The refractive power of the eye is increased by the unnatural convexity of the cornea; and his object was, by getting rid of the lens, to counterbalance that increased refraction. I should not think of proposing any such operation, unless the affection had gone so far as to make the eye useless; and I should then expect no good from it. The proceeding has not been employed with advantage in any instance. We must, I believe, confess at last, that we do not understand the pathology of conical cornea, that its causes are totally obscure, and that we know no treatment capable of remedying it.[*]

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paper. The exterior two-thirds were thickened, the increase being in the middle laminæ. The thicker was gradually continued into the thinner portion, which was about the size of a moderately dilated pupil.—Ammon's *Zeitschrift*, vol. i. p. 548.

[*] The affection was first noticed by Léveillé, in a note to his translation of Scarpa's work on Diseases of the Eye, tom. ii. p. 179. It was particularly described under the name of *conical formed cornea*, by Mr. Wardrop, in his *Essays on the Morbid Anatomy of the Eye*, 1808, vol. i. ch. xiii. He has also given a figure of it in the ninth Plate of his work. A good coloured figure of the complaint is given by Demours, Pl. 57. fig. 1, who states that he and his father

Effusion of blood into the chambers of the eye has been technically denominated *hæmophthalmus.* I have already mentioned this as an effect of injury in CHAPTER VI. I have also stated that blood is occasionally effused, in conjunction with matter in hypopyon, and in iritis.

This effusion seems sometimes to be vicarious of menstruation. "I have seen," says P. F. VON WALTHER,* "a considerable quantity of blood effused into the anterior chamber, so as to form a true *hæmophthalmus*, in many cases of acute ophthalmitis. This happened particularly in one instance, where the affection occurred regularly at the monthly period, and supplied the place of the suspended menstruation."

The following case is in some respects analogous:—

"Louisa Martin, aged forty-five, ceased to menstruate during three months without inconvenience. She had suffered some injury of the eyes in early life from small-pox, and had always had weak sight. To these symptoms had lately been added some appearance of incipient cataract, and within the last twenty days she had been affected with an acute and permanent pain on the right side of the head, with throbbing. Besides this, however, there was no change in the habitual state of her eyes till the night of the 28-9th of August, when she experienced a sharp pricking in the right eye, giving the sensation of a foreign body, which she endeavoured to get rid of by rubbing the part. In the morning she found that the sight of that eye was lost. She applied fomentations of rose-water, and afterwards cold spirits and water, without avail. On the 6th of September she was admitted at La Charité. The ball of the eye was slightly tumified; the vessels of the conjunctiva injected; the cornea of the affected side more prominent than the other, and perceptibly softer, (?) behind it was seen an effusion of blood, occupying the lower part of the anterior chamber, changing its place with the movements of the head, and rising to a level with the edge of the pupil. The head-ache and pricking continued but slightly. The pulse was natural, but there were night sweats.

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had often seen it. *Traité des maladies des yeux*, &c. tom. i. p. 316. Dr. LYALL detailed the particulars of four cases, and gave to the affection the name of *staphyloma pellucidum conicum*, in an Essay which he contributed to the *Edinb. Med. and Surg. Journal*, vol. vii. p. 6. He afterwards made it the subject of his inaugural dissertation, printed at Petersburg in 1816.

These, with some other notices on the subject, are collected by HIMLY in his *Bibliothek für Ophthalmologie*, vol. i.

* *Abhandlungen*, p. 395.

As this patient exhibited at the same time signs of gastric disturbance, an emetic was ordered on the 7th, which was the only treatment adopted till the 10th, when an astringent wash was prescribed; but, as yet, the blood effused has not been re-absorbed."[*]

In some rare instances blood has been poured out in this situation without previous injury or inflammation, or any recognizable morbid state of the organ. A remarkable example is related by Professor WALTHER. In a healthy young peasant, who saw well with both eyes, blood came into the anterior chamber, as he was working at harvest, much heated, and in a bending position. Subsequently the effusion would occur in consequence of any considerable exertion, or indulgence in drinking, especially when the head was held down. WALTHER saw the blood appear, first in small quantity, then gradually increase till it reached the level of the pupil. It would disappear completely in eight or ten minutes. When the effusion was considerable, it was attended with pain and tension of the globe. The blood appeared to come from the posterior chamber.[†]

In an analogous example related at length by Mr. JOHN BELL,[‡] the effusion occurred in the first instance, in a gentleman of twenty, in consequence of violent exertion in running; and had recurred repeatedly. More pain was experienced than in the former case, and the absorption of the blood was not accomplished until after many days. Vision at last began to suffer, and it seemed probable that sight might be lost.

AMMON[§] relates an instance of spontaneous sanguineous effusion in the anterior chamber of a diseased eye.

The appearance of pus in the anterior chamber, under various circumstances, has been already described under the name of *hypopyon*. See CHAPTER XVI., SECTION 2.

The effusion of lymph in the chambers of the *aqueus humor*, which occurs in inflammation of the iris, see CHAPTER XVII., SECTION 1, has been technically called HYPOLYMPHA.

It has been supposed that milk, or a fluid nearly resembling it, is poured out sometimes into the chambers of the eye, and the name of *hypogala* has been given to the case. I do not consider that the fact is as yet established by sufficient evidence. Rosas, however, admits it, and says that it occurs under the following circumstances, viz. in suckling women, when the secretion of the breasts is suddenly interrupted or suppressed; or in other individuals, of either sex and every age, who take milk diet, and are exposed to disturbance of the cutaneous functions.[*]

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[*] *London Medical Gazette*, vol. v. p. 123. From the French periodical called *La Lancette*.

[†] *Merkwürdige heilung eines eiterauges*, p. 61.

[‡] *Principles of Surgery*, 4to. vol. iii. p. 270.

[§] *Zeitschrift*, vol. i. p. 103.

Beer[†] says, that he has seen spherules of quicksilver in the anterior chamber three times in venereal patients.

CHAPTER XXII.

AFFECTIONS OF THE IRIS, LENS AND CAPSULE, AND VITREUS HUMOR. GLAUCOMA.

Congenital deficiency of the iris.—Sometimes the iris is entirely deficient, vision being at the same time imperfect, frequently so much so, as hardly to answer any useful purpose. I have lately seen two infants a few months old, in whom this congenital peculiarity existed. They were supposed to be blind, and brought to me on that account. I could observe no other defect except the absence of iris. They did not bear exposure to light well. In one I thought that I could observe a reflection of light at one part, as if there had been a narrow rudiment of iris. The parents of these infants had no defect in the eyes. In Ammon's *Zeitschrift*,[‡] mention is made of three sisters born without iris. The father has only a rudiment of iris at the lower margin of the cornea. The full light of day is offensive to him, and his sight has become impaired lately, so that he makes out even large letters with difficulty. The eldest daughter, now twenty-eight, was born without irides, always experienced intolerance of light, and saw imperfectly. She has lost one eye by inflammation, which was followed by total staphyloma. The second daughter, aged twenty-one, with complete deficiency of the iris, cannot bear the light, and is troubled by repeated ophthalmiæ, with increasing imperfection of sight. The youngest daughter, thirteen years old, has clear black pupils; but like her sisters has not been able to read and write.

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[*] *Handbuch*, vol. ii. p. 671.

[†] *Repertorium*, vol. ii. p. 97.

[‡] Vol. i. No. 4.

BARATTA[*] saw complete congenital deficiency of the iris in both eyes of a youth aged twenty-two. There had been great weakness of sight from birth. He distinguished distant objects very imperfectly; near vision was rather better. When this person was seen again at the end of a year, he had cataracts. The lens was of natural size and steady in its position on one side, with a black circle round it of a line in breadth, through which the patient had good sight. The other cataract moved backwards and forwards, reclining backwards when the head was erect, and coming against the cornea when he stooped.

Coloboma iridis.—Another original peculiarity in the iris consists in a fissure of its lower portion, and a consequent prolongation of the pupil to the margin of the cornea. This natural defect, which is not very uncommon, although previously known, was first expressly noticed by Professor WALTHER,[†] who gave it the name of *coloboma iridis*. The sides of the fissure are sometimes perpendicular, sometimes a little inclined towards each other below, so as to make the lower portion of the pupil triangular. I am acquainted with a youth in whom this natural defect exists, his eyes being well formed in all other respects, and vision being perfect. No deviation from the normal structure exists in the eyes of his parents, brothers, or sisters. AMMON [‡] examined after death the eyes of an individual in whom this peculiarity existed. There was a rising of the sclerotica along the middle line, on the under surface, and towards the back part of the globe. Corresponding to this external rising, there was a fissure of the choroid and retina, from which a rising fold was continued in front along the corpus ciliare, where it took the place of ciliary processes. An impression in the lower part of the vitreus humor corresponded to this fold. The lens had not quite its regular figure below.

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[*] *Osservazioni pratiche*, vol. ii. p. 349.

[†] *Ueber einen bisher nicht beschriebenen, angebornen Bildungsfehler der Regenbogenhaut*, in GRAEFE u. WALTHER'S *Journal*, vol. ii. p. 601. The various recorded cases are referred to by SCHÖN in his *pathologische anatomie des menschlichen auges*, p. 70.

[‡] *Zeitschrift*, vol. i. No. 5, with figures.

Varieties of colour.—I have mentioned in the anatomical description of the iris, the varieties of colour which it presents. I may add here an example of natural difference between the two irides, which should have been noticed in that description. In a gentleman of florid complexion, with much colour in the face, and dark hair, the right iris is grey, with a slight blue tinge; the left is light brown, except about one-fifth, which is grey like the right.

Change of colour in the iris.—Sometimes the iris undergoes change of colour without any other indications of disease. A lady, thirty-five years of age, of dark complexion, black hair, and dark irides, had passed eleven years in hot climates. When I saw her, the right iris had been slowly changing in colour for two years, and had acquired a dull grey tint. There had been no inflammation, pain, nor other assignable cause. The iris moved properly, the pupil was natural, and she could read the smallest print, but complained of dimness. Another lady, of fifty-eight, has a bright dark brown iris in the right eye, while the left is light grey and rather dull. There is also a firm lenticular cataract in the latter eye. Both eyes were originally very dark. The colour of the left iris changed twenty years ago without inflammation, pain, or diminution of sight. The cataract has existed eight years.

I have several times seen change of colour in the iris in conjunction with capsulo-lenticular cataract. In a person of twenty-five, who has opacity of the capsule, with incipient opacity of the lens, the sound eye is orange, inclining to yellow, while the other is a dull bluish grey. In another, the right iris is very dark; the left, with capsulo-lenticular cataract, is light grey. There has been no inflammation.

Spotted iris.—Dark brown spots of roundish figure and various number, seldom exceeding the size of a pin's head, are frequently seen on the iris. They are often met with in eyes that are not quite sound; but they occur also where there has been no disease, nor any diminution of vision. They do not belong to the original structure of the iris, for we do not see them in young subjects; and in most individuals they do not occur at all. They are met with about or after the middle period of life.

Prolapsus, or *procidentia iridis.*—The iris floats loosely in the aqueus humor. When an opening is made in the cornea by wound, sloughing, or ulceration, that fluid escapes, and the iris passes out at the aperture, forming a kind of hernia, more especially if pressure be made on the globe by its muscles, or if the parts in front are pushed forwards by inflammatory congestion in the posterior tunics. The tumour formed by the protrusion is called sometimes *staphyloma iridis*. If the cornea be completely penetrated, as in wounds and some ulcers, the protruded iris is naked and forms a dirty-looking brownish or greyish irregular and ragged prominence. If the membrane of the aqueus humor remains entire, it gives a smooth covering to the prolapsed iris. The protrusion of the whole iris, after general slough of the cornea, is called *staphyloma racemosum*; a small prolapsus, forming a brownish tumour, as large as a fly's head, is called *myocephalon*, and those of larger size have received the names of *clavus*, or *helos*, and *melon*. The progress and result of the protrusion are described in CHAPTER X., on *gonorrhœal ophthalmia*.

The *treatment* consists in removing the inflammation; no specific measures are required for the prolapsus. Whether in the case of wound or ulcer, we cannot replace the protruded portion. It would not come out unless there were pressure from behind; we cannot restore it in opposition to this force, and the attempt would only aggravate the mischief.

If the tumour should not subside, when the inflammation has been removed, if its friction against the lids should cause renewed irritation, it has been recommended to touch it with lunar caustic scraped to a point, for the purpose, both of reducing the tumour, and of furthering the adhesion of the protruded part to the corneal aperture. This application must be used cautiously, since it may not only fail to do good, but be absolutely injurious. I do not use the caustic, having found that the prolapsus recedes when inflammation has been quieted.* If the protrusion were large, it might be expedient to puncture the part, so as to let out the aqueus humor, and consequently lessen the tension of the globe. A small quantity of a strong solution of nitrate of silver might then be carefully applied with a camel-hair brush.

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* My opinion and experience on this subject coincide with those of DEMOURS, who observes, that "la petite portion de l'iris, pincée entre les lèvres de l'ouverture de la corneé, s'atrophie et se perd peu-à-peu." Respecting treatment, he says, "après de nombreux essais, je me suis aperçu que tout ce qui provoquait l'augmentation de la phlegmasie etait nuisible, que l'on devait, sans s'arrêter à cet épiphénomène, s'attacher à combattre les causes qui lui ont donné naissance, en un mot, qu'il ne fallait rien faire à la hernie de l'iris, quelle que soit la cause qui lui ait donné lieu, et que les efforts seuls de la nature, lorsqu'ils n'étaient point contrariés, suffisaient pour la faire disparaître en quelques semaines ou en quelques mois, selon sa situation, son volume, et la gravité des causes qui lui ont donné naissance."

"Pour moi, une guérison obtenue par le nitrate d'argent fondu, est une guèrison obtenue malgré l'emploi de ce caustigue. La nature est si habile! Elle resiste avec tant d'énergie à l'action des mauvais moyens"—*Traité des Maladies des Yeux*, tom. i. p. 302—304.

Prolapsus iridis may cause unfavourable changes in the pupil, so as either to impair or destroy vision. The figure of the opening may be rendered oval or elongated; the pupillary margin may be drawn out of place so as to contract or close the opening. If, in addition to such displacement and contraction, there should be opacity of the neighbouring portion of the cornea, vision will be rendered very imperfect, or entirely destroyed. Sight may not be injured by a small protrusion near the margin of the cornea, above or on either side of the pupil; while, if it take place towards the centre, it may involve the entire pupil, and thus cause blindness. The pupil may be closed in consequence of a prolapsus at the edge of the cornea. There may be two or more protrusions, not only lessening the size of the pupil, but drawing it into the form of a narrow slit.

The changes in the figure of the pupil, and in the state of its margin, and the adhesions, which the iris contracts to the neighbouring parts, are considered in CHAPTER XVII., on *iritis*. The adhesion of the uvea to the crystalline capsule caused by iritis *(synechia posterior,)* and that of the iris to the cornea, which is at the same time generally opaque, in common and purulent ophthalmia, or after prolapsus *(synechia anterior,)* cannot be remedied by operation. In these cases, however, especially if complicated with contraction of the pupil and the formation of adventitious membrane in its aperture, we are often able to render essential service by the use of belladonna. A small dilatation will sometimes extend the edge of the pupil beyond the corneal opacity. Even in cases where there is an adventitious membrane in the pupil, and its margin appears at first sight adherent throughout, it has been often found, on applying the belladonna, that a small portion of the opening has remained free, and capable of dilatation, with great improvement of sight. We ought not, therefore, to consider these cases irremediable; and I have often been surprised to find how well patients could see through a minute pupillary aperture. I have seen patients enjoying tolerable vision, when the opening in the iris has not been larger than a small pin's head. In these cases, if we find that the use of belladonna will give the patient vision, or improve it, we must employ it once in twenty-four hours, to keep up its effects permanently. Some of these cases admit of no other remedy; but others may be relieved by making an artificial pupil.

Myosis and mydriasis.—The pupil may be unnaturally contracted or dilated, the first being called *myosis*, and the latter *mydriasis*. It is not uncommon to meet with individuals who, being accustomed to look at extremely minute objects, have contracted pupils, yet see perfectly well.

A preternaturally dilated pupil is not a common occurrence in the sound state of the eye; it is most commonly dependent on a loss of sensibility in the optic nerve. If the pupil be dilated with a sound nerve, the sight may be benefited by looking through a bit of pasteboard darkened within, and having in its centre a small opening, corresponding to the natural size of the pupil. It might be fixed into a frame, and worn as a spectacle.

Opacity of the lens and capsule, or capsulo-lenticular cataract, is among the consequences of internal ophthalmia. Such cataracts are complicated with effusion of lymph, and consequent adhesions and irregularity of the pupil. Where the inflammation is so serious as to produce these effects, it almost invariably extends to the retina, disorganizing it, and thus causing amaurosis. This form of disease is irremediable. Lymph may be absorbed from the pupil while the effusion is recent, but not when it has become organized. The condition of the lens and capsule cannot be altered by internal treatment; and the state of the retina in most instances precludes all expectation of benefit from operation.

The subject of cataract generally will be considered separately.

Spontaneous passage of the crystalline into the anterior chamber.—A few instances are recorded, in which the lens, either in an opaque or in its naturally transparent state, has come through the pupil into the anterior chamber without any apparent cause. In one instance, observed by Professor Himly,[*] the vitreus humor was in a fluid state; in the others, the eye was more or less diseased. The previous changes in the organ, and the mode in which the displacement occurs, are not however as yet clearly understood. The presence of the lens in the anterior chamber, as in the instances in which it becomes thus displaced from external in-

[*] Loder's *Journal*, vol. i. p. 127.

jury, sometimes causes so much inflammation and pain as to render its removal by incision of the cornea expedient.

From the two following cases, related by Professor CHELIUS,[*] of Heidelberg, it should seem that this spontaneous prolapsus may occur in eyes previously healthy. "A robust man, about thirty years of age, felt suddenly a violent pain in the left eye: at his admission, a few days afterwards, great intolerance of light and lacrymation were present; the conjunctiva and sclerotica were injected. The iris was not changed in colour, but its upper margin was pushed forwards. Part of the lens protruded into the anterior chamber, transparent, though of a greyish yellow hue. Under suitable treatment, the inflammatory symptoms subsided; the lens remained in its position, and after a few weeks gradually became opaque, so that sight was completely lost. The patient would not consent to the performance of extraction. A middle-aged woman, who had formerly been subject to rheumatism, was affected with rheumatic ophthalmia and spontaneous prolapsus of the lens, accompanied by the same symptoms as in the preceding case. The inflammation having been subdued, extraction was performed, with partial recovery of sight."

In a case related by Professor AMMON,[†] a serious injury of the eye had occurred in early life, followed by "a prolapsus of the choroid coat, which drew the pupil outwards, and increased to such a size by accumulation of fluid within, that its removal became necessary, and was successfully performed by Dr. SCHMALTZ, of Pirna. The patient could use her eye after the operation, although she felt weakness in it, which did not trouble her much." Many years after, (April, 1830,) having had occasion to exert herself considerably, she felt pain in the eye: the sight became very dim, and her husband saw what he thought a bladder in the anterior chamber. Various means were used without relieving her pain, which was considerable, and she consulted Professor AMMON, in August. The eye was now inflamed, painful, and watering, the anterior chamber being completely filled by an opaque lens. The pains were relieved, but returned with great violence, and several remissions and exacerbations occurred till the month of October, from which, until the time of writing the history, in December, the patient had been easy. On each alleviation of the inflammation and pain, the lens underwent visible diminution, and it was thus reduced to one-third of its natural size, lying obliquely in the anterior chamber, and leaving the pupil free. Vision was lost.

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[*] *Heidelberger Klinische Annalen*, b. iv. st. iv. p. 521.

[†] *Zeitschrift für die Ophthalmologie*, band i. p. 260.

Dr. ULLMANN,* of Marburg, extracted the lens from the anterior chamber of a patient, thirty-seven years old, in whom cataract had taken place before the age of twenty. This female, in whom menstruation had begun late, and been very irregular, and who had suffered much from catarrhal and rheumatic affections, pains in the head, erysipelas of the face, and disordered digestive organs, represented that the lens had been in the anterior chamber nine months, having previously passed occasionally through the pupil, and returned on lying down. Since the lens had been permanently in its unnatural situation, there had been great pain in the eye and head, with frequent inflammation of the former, and muscæ volitantes on the opposite side. The anterior chamber was filled with a brownish grey cataract, squeezed against the cornea, which Dr. U. found it necessary to remove. It was a capsulo-lenticular cataract; the capsule formed a thick cretaceous shell, in the cavity of which there was a small nucleus of the lens. The pains ceased after the operation, and the health was much improved. At the end of some months the pupil was clear, and there was considerable vision.

Glaucoma.—The name of *glaucoma*, which was formerly given to cataract, is now used to denote an affection of the eye, attended with alteration in the colour of the pupil. It is an important disease, because the discolouration of the pupil may be confounded with cataract, and because it is either originally attended with impaired vision, or leads in its progress to diminution or loss of sight.

Symptoms.—The first symptom is pain in the head, usually situated over the brow, and frequently the patient describes it as extending quite across the forehead. This pain in many cases is very severe, but in others not so strongly marked, or even absent. At the same time, the patient begins to complain of dimness or weakness of sight; and, if we examine the eye, we find that instead of exhibiting its natural black colour, the pupil is sea green, clear green, muddy green, or yellowish green. There is a discolouration, which, if we look at it in a strong light, appears like a yellowish metallic reflection, and sometimes concave: it looks almost as if there was a portion of metal at the bottom of the eye. The pupil at the same time is generally rather dilated, and the iris sluggish in its motions. The state of vision is different in different instances; in some, the alteration of the pupil is distinctly produced, and yet vision remains tolerably perfect. In other cases vision is entirely lost, though the change of colour in the pupil is not greater than in the former instance. Sometimes vision is impaired in one eye and not in the other, though the pupil may be equally discoloured in both.

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* *Zeitschrift für die Ophthalmologie*, b. ii. p. 129.

In the progress of the disease, vision gradually grows worse and worse; the discolouration of the pupil, or rather of the fundus of the globe behind the pupil, becomes more considerable; the iris is more sluggish, until it becomes at last motionless, and vision is entirely lost. The affection does not always stop at this point, but sometimes attacks the lens, and renders it opaque, so that it is no uncommon thing for cataract to occur subsequently in an eye which was originally attacked by glaucoma. The cataract thus produced is greenish, yellowish, or dirty white, (*cataracta viridis* or *glaucomatosa.*[*])

Sometimes the lens and iris are pushed forwards, so that the latter is convex; it may even be in contact with the cornea. The external vessels of the globe are sometimes enlarged and varicous; but all the characteristic appearances of glaucoma may occur, with loss of sight, without any change in the state of these blood-vessels.

Causes.—We can point out nothing peculiar as contributing to its occurrence. It takes place at or after the middle period of life, in those whose constitutions have been impaired by free living, especially by drinking. It appears to me to be a chronic form of the same affection which I have described as arthritic inflammation affecting the internal tunics; the changes which occur in the retina, vitreus humor, and lens, as the consequences of that inflammation, are rapid and sudden, whilst in the present case the disease has a slower progress. It certainly occurs more frequently in such persons as are liable to gout than in others. "Glaucoma and green cataract," says BEER,[†] "considered as consequences of inflammation, belong to arthritic inflammation of the globe; and the same forms of disease, when occurring without inflammation, are only seen in the gouty."

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[*] WELLER has delineated, in several figures, the appearance of the eye in the various stages and forms of glaucoma. See his *Icones ophthalmologicæ*, fascic. i. plate 1, 2.

[†] *Lehre*, vol. ii. p. 255.

Seat of disease.—The situation of the discolouration has naturally led to the supposition that it arose from change of structure in the vitreus humor, and it has accordingly been assumed, without direct evidence, that inflammation of this structure produces the phænomena of glaucoma. The close connexion of the retina would lead us to expect that it would often suffer in conjunction with the vitreus humor originally; or that inflammatory affection commencing in the latter, would soon extend to the former. Thus we might explain how sight is seriously impaired, from the beginning, in some cases; while in others, amaurosis appears secondarily, and proceeds slowly. Mr. MACKENZIE has recently shown, by pathological examinations, that the commonly received notions on this subject are incorrect. He found the following changes to have occurred in eyes which had been affected by glaucoma:—"1. The choroid coat, and especially the portion of it in contact with the retina, of a light brown colour, without any appearance of pigmentum nigrum. 2. The vitreus humor in a fluid state; perfectly pellucid; colourless, or slightly yellow. No trace of hyaloid membrane. 3. The lens of a yellow or amber colour, especially towards its centre; its consistence firm; and its transparency perfect, or nearly so. 4. In the retina, no trace of limbus luteus or foramen centrale."*

Professor WALTHER† examined the eyes of a man, who had lost his sight a year before death, with violent pain of the head. Besides the discolouration of the pupil, which was not considerable in proportion to the loss of sight, the aperture was rather dilated, the iris convex anteriorly, the sclerotica bluish over the corpus ciliare, and vision completely extinct, although light was offensive. Several varicous vessels were observed in the conjunctiva and sclerotica. The lens and vitreus humor were in the normal state, and perfectly transparent: no change in the choroid. In the retina of both eyes were numerous black, and partly reddish spots, roundish, and of various size: they were more numerous towards the dentated margin, and not disturbed in their situation by gentle pressure.

Two glaucomatous eyes were dissected by EBLE.‡ One was from a woman of sixty, who had suffered much from gout, and had had glaucoma completely developed in one eye for a year before death. The covering of the uvea was reddish brown, instead of the usual dark pigment. The vessels of the choroid were varicous in several places, particularly in the ciliary processes; the pigment was much lighter than natural, and had disappeared in many parts. The retina was of extraordinary softness; it was almost fluid. The capsule was partially opaque; the lens small, firm, and of amber colour. The whole vitreus humor had a yellowish tint; and there were scattered through it twenty or thirty points of a grey, brownish green, or sea-green colour.

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* *Glasgow Medical Journal*, vol. iii. p. 259.

† *Abhandlungen*, p. 40—42.

‡ AMMON's *Zeitschrift*, vol. i. p. 310, 311.

The other patient was seventy years old, had frequently experienced arthritic inflammation of the eyes, and had become glaucomatous shortly before death. The vitreus humor was partially thickened, and firmer to the touch. The retina was more seriously affected than in the former instance, the vessels exhibiting some varicous enlargements, and the colour being dark grey.

"The pathological changes," says Professor Rosas, "exhibited by glaucomatous eyes are various. The vitreus tunic is commonly thickened, covered with lymph, ossified; the vitreus humor degenerated; the retina thickened, and marked with red spots; the choroid varicous. In a case, which I examined, the vitreus humor contained a reddish grey fluid, with brownish particles intermixed; the retina was thickened, the choroid varicous, and the lens converted into a yellowish, red, cheesy mass. In another instance, the vitreus humor formed a true fungous growth (*schwammgewächs*,) from which, when cut into, blood flowed; the retina was leathery and white, the choroid thin and atrophic, and the lens converted into a purulent fluid. In a fourth case I found the vitreus humor, together with the lens which had become confounded with it, ossified, the retina cartilaginous, and the choroid atrophic. All these preparations are preserved in the pathological collection of the ophthalmic department in the university of Vienna."*

From the preceding pathological facts, we may conclude that the vitreus humor is not originally and essentially the seat of glaucoma: we may perhaps draw the further inference, that affections in some respects different are included under that term. When we consider the numerous gradations between the acute internal arthritic ophthalmia, which destroys sight at once; and the imperfection of vision, which comes on so slowly in glaucoma, properly so called; also that difference of morbid changes may be expected according to the stage of the complaint, we shall not be surprised at finding that the results of examination are not always alike.

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* *Handbuch*, vol. ii. § 1203.

The cases examined by Professor Rosas must have been arthritic inflammation of the internal tunics, and chiefly in their chronic stage; some of the disorganizations, which he met with, are such as occur only after long continuance of disease.

The phenomena of glaucoma, according to these dissections, must be referred to disease of the choroid and retina; and the reflection of light from the surfaces thus morbidly altered, especially if the lens should have begun to exhibit that change to amber colour which takes place in advancing age, will sufficiently explain the change of colour behind the pupil.

Diagnosis.—The discolouration of the pupil arising from glaucoma, and that from cataract, may be distinguished by the tint of colour. In glaucoma it is green or yellowish green, and if we look at the eye laterally, we see no discolouration, whilst in cataract the pupil is grey, or greyish white, and it has the same appearance in whatever direction it is viewed. The loss of vision in glaucoma is not in direct proportion to the change of colour in the pupil; with an inconsiderable change, vision may be entirely destroyed or seriously impaired; but in cataract there is a direct proportion between the degree of opacity and the injury to sight. In cataract, vision is best in a moderate or weak light; but in glaucoma it is most perfect in a strong light, because in glaucoma, as the retina is less sensible, more light is required to make an impression on it.

Prognosis.—The prognosis in glaucoma is unfavourable; we have no means of changing that condition of the internal parts, on which the loss of transparency depends; we cannot bring back again the natural appearance of the pupil; we cannot restore the vision which has been lost; and all we can expect to do, is to preserve the little sight which remains.

Treatment.—Beer[*] says that no treatment will be of any effect in preventing complete amaurosis. But I cannot agree with him on that point. There is congestion in the head, the removal of which is attended with considerable benefit. The treatment must be decidedly antiphlogistic: we must take blood by cupping, give active purgatives, and administer mercury. The patient must be put upon a regulated plan of diet, and avoid using the eyes. If this treatment be followed up, we shall prevent the disease from advancing.

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[*] As Beer speaks of glaucoma with green cataract, his observations probably refer rather to the state in which the eye is found after acute arthritic inflammation of the internal tunics, than to the disease which I have been describing, in which sight is affected in conjunction with a peculiar discolouration behind the pupil, the lens retaining its transparency, and without previous apparent inflammation. I have found by repeated experience that many of these cases

In the first place, when there is active congestion with pain, the patient is relieved from his uneasy sensations. The continued prosecution of the plan will not only prevent the disease from advancing, but even improve sight when it is begun at an early period of the affection. After taking blood by cupping, which may be repeated according to circumstances, it is sometimes necessary to persevere for weeks or months in the use of mercury, not carrying it to the extent of salivation, and at the same time carefully regulating the diet. In this way I have seen the swoln and pimpled countenance of a drinker surprisingly altered for the better, with corresponding improvement in the complaint; and in some instances, where considerable discolouration of the pupil has been attended with slow inflammation of the iris, evidenced by adhesion of its margin, and with protrusion of it against the cornea, the disease has been kept in check, and good vision has been preserved for years.

Synchysis oculi.—Another change occurs in the vitreous humor, the nature and causes of which are obscure: it is the conversion of it into a fluid state, called *synchysis*, a Greek word, which means melting. It may be the result of long-continued internal inflammation, but it is sometimes a gradual change in the consistence of the vitreous humor, unconnected with inflammation. The fluid has sometimes a brownish discolouration. The iris is little affected in its colour or figure; but instead of the natural changes of the pupil, or rather instead of the gradual contraction and relaxation of the fibres of the iris, there is a peculiar *tremulous* or *oscillatory motion* of the *part*; the natural support, which the iris receives from the parts behind, is lost, and hence it shakes backwards and forwards like a rag in a bottle of water. It is an appearance at once very striking and characteristic of the affection. The globe loses its tension, and feels flaccid. The lens often

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of considerable relief; but I quite agree with Beer in regarding the com- of glaucoma with green cataract as incurable. See *Lehre*, vol. ii. 456.

loses its transparency in these cases, and cataract is added to the other affection; the capsule of the lens has been found converted into a cretaceous substance, which could be distinguished by its peculiar yellowish white colour. This state of the vitreus humor has been seen as the result of internal inflammation.

BEER* says that, as the result of inflammation, he has seen synchisis only after venereal ophthalmia, and that a careful consideration of such cases had led him to the conclusion, that it was owing to the abuse of mercurial medicines, particularly calomel. I have met with no facts capable of supporting such an opinion, which seems to rest merely on the antiquated notions which ascribe to mercury a resolvent power. Having used this remedy freely, both in syphilitic iritis and other forms of ophthalmic disease, I should have had ample opportunities of observing the fact, if BEER's supposition had been correct: such a result has never come under my observation.

I have seen synchisis produced by the internal inflammation consequent on penetrating wounds of the globe. I have also seen it with flaccidity of the globe and impaired vision in a boy of eighteen, in whom there was no apparent cause for it. Discolouration of the iris with tremulous motion of it, cretaceous cataract, and adherent pupil, are sometimes met with, though the globe may not be flaccid: it is doubtful, in these cases, whether the vitreus humor is fluid or not. I have, however, seen it flow out of the eye, as a brownish watery liquid, when extraction of the cataract has been performed in such a case.

Usually, this state of the vitreus humor indicates a diseased condition of the internal parts of the eye; and we find that the retina has lost its sensibility in such cases. Such a state of the vitreus humor cannot be remedied; and if a cataract should be present, its removal will not improve vision.

In a few instances, I have seen the iris tremulous, and that to a great degree after the operation for cataract, with good vision.

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* *Lehre*, vol. ii. § 216.

CHAPTER XXIII.

CATARACT.

SECTION I.—GENERAL DESCRIPTION OF THE DISEASE; ITS CAUSES AND TREATMENT; VARIOUS OPERATIONS.

CATARACT is a partial or general opacity of the crystalline lens, of its capsule, or of the MORGAGNIAN fluid, separately or conjointly, with a corresponding diminution of sight. BEER includes, in his definition of cataract, all those impediments to vision, which are situated in the posterior chamber, between the uvea andthe front of the vitreus humor,* whether arising from opacity of the lens, of its capsule, or of the aqua MORGAGNI; or from the effusion of lymph under the inflammatory condition of the iris, and its subsequent organization into an adventitious membrane, from the effusion of blood or pus, or from depositions of the colouring matter of the uvea upon the capsule. He then divides cataracts into *true* and *spurious*.† Under the former head are comprised the opacities of the lens, capsule, and aqua MORGAGNI; while the latter comprehends all the others, which he has named *cataracta lymphatica*, *membranacea*, *purulenta*, *grumosa*, and *dendritica*.‡ Under the latter name, or those of *cataracta arborescens* or *choroidalis*, has been designated the deposition of the colouring substance from the uvea upon the front of the crystalline capsule. See the remarks on this subject in CHAPTER XVI. page 294, 295.

These *false cataracts* are various results of injury and disease, affecting the chambers of the aqueus humor generally, or the iris in particular; and their consideration belongs to other parts of this treatise. To call them cataracts, and thus assimilate them to the peculiar change of the lens and capsule, which has been usually and properly designated by that term, is a combination under a common name of affections totally distinct in their causes and nature, and likely to cause, especially with students, confusion and obscurity in pathology and treatment. I therefore employ the word cataract, in its old and more limited sense, to express the opaque condition of the lens, its capsule, and the MORGAGNIAN fluid.

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* *Lehre*, vol. ii. p. 279.

† *Ibid*. p. 285.

‡ *Ibid*. p. 303.

The most striking circumstances observable in cataract are, an opaque body placed behind, or even filling up the pupil, and the impaired state of vision, which is the result of that change. In both these respects it agrees, in its incipient stage, with glaucoma and some forms of amaurosis; but as the treatment is essentially different in these several affections, it is necessary to discriminate them accurately. In incipient cataract, we can do little or nothing; we must wait until the opacity has become complete, before we perform an operation; but active means must be resorted to in the earliest stage of amaurosis: if we should leave the case to itself under the supposition of its being cataract, loss of sight would be inevitable and irremediable.

The distinction of cataract from other affections is therefore very important; and in doubtful cases we shall be much assisted by artificial dilatation of the pupil. We should therefore examine the eye in such cases, under the full influence o belladonna, so that we may obtain a clear view of the changes which may have occurred behind the pupil.

Cataract is usually developed slowly, requiring some weeks, months, or years, for its complete formation; it may, however, come on much more quickly, even in a few hours. It seldom destroys sight completely, even in its perfect development. In many forms of cataract a considerable degree of vision remains; and in the worst cases, the patients can distinguish light from darkness, if the retina be sound.

It may appear in one eye, or in both. In the former case, the second eye is generally affected sooner or later. In a few instances the complaint is confined to one eye.

Colour and situation of the opacity.—The colour of the opacity in cataract may be described as grey, passing on one side into a bluish white, and on the other into a yellowish brown, or the colour of amber. The opacity of the pupil in glaucoma is green, a dull green, or yellowish green. Incipient cataract sometimes exhibits a similar tint, so that the mere circumstance of colour is not sufficient to establish the diagnosis between the two affections. The situation of the opacity is a better ground of distinction: in cataract it is near the pupil, and in many instances immediately behind that aperture; but in glaucoma and amaurosis the discolouration is deeper seated, it looks as if it were at the bottom of the eye. Hence, when we view the eye laterally in glaucoma, we lose sight of the opacity; it is only when we look directly into the opening that we see the discolouration, which also is equally diffused, the pupil appearing uniformly opaque, while occasionally the opacity looks concave. As age advances, the quantity of pigment in the choroid is diminished, and the membrane at last becomes pale. Hence the pupil presents a grey appearance, so nearly resembling that of cataract, that on the first view we may mistake it for that disease. By looking at the pupil laterally we immediately discover that the lens is not opaque; and the unimpaired state of vision will prevent us from confounding the case with cataract.

State of vision.—In cataract the opacity begins generally in the centre of the pupil, and extends to the circumference; consequently, it is more dense in the centre and less so towards the sides. Hence light passes through the circumference of the pupil, enabling the patient to see objects laterally, when he cannot see them directly in front of the eye. Dilatation of the pupil by exposing the margin of the lens, which is sometimes transparent when the centre is opaque, and at all events is much thinner, and therefore less densely opaque, improves vision considerably, especially in incipient lenticular cataract. Such patients see best in the dusk or twilight, or when the pupil has been artificially dilated. They see best when the back is turned toward the window: in that position, and with the eye shaded by placing the hand above it, the pupil is so much dilated that a person with imperfect cataract may be able to read, while if he turns round and opens the eye against a strong light, he may be unable to distinguish a letter. These circumstances distinguish cases of cataract from those of glaucoma and amaurosis; for in the latter affections the sensibility of the retina being impaired, the individual sees best in strong lights, his sight is not improved by belladonna, and he sees better when looking towards the window than when his back is turned to it. Such differences are characteristic, and often sufficient of themselves to establish the diagnosis.

The mode in which vision is impaired by cataract is this: objects appear at first as if surrounded by a mist or fog; the patient fancies that something is interposed between his eye and what he looks at, whilst haziness or cloudiness increases gradually in proportion to the degree of opacity. The various modes in which sight suffers in amaurosis will be particularized in an ensuing chapter. A cataract patient sees a lighted candle as if it were involved in a cloud, which becomes thicker as the opacity proceeds, and ultimately shrouds the flame so completely, that its position only is discernible; to one with amaurosis, the flame of a candle appears as if scattered into rays like a star, or surrounded by a halo, or confused with prismatic colours. The sight is impaired in cataract in proportion to the degree of opacity; but there is no such direct ratio in glaucoma and amaurosis; for, with only a slight greenish discolouration of the pupil, there may be considerably impaired vision, such as the opacity would not account for; indeed sight may be entirely destroyed, when there is only a slight discolouration of the pupil.

Iris and pupil.—The iris and the figure of the pupil are not affected by cataract, at least in the early period of its formation: the iris continues to move as usual; the pupil retains its natural figure. In some cases the lens is increased in bulk, which causes it to press upon and protrude the iris, and consequently impede its motions. The changes of the pupil and iris in amaurosis and glaucoma form a striking point of distinction. In the affections last mentioned, the pupil is generally more or less dilated, the iris motionless or sluggish, and the pupillary aperture not perfectly round, sometimes angular. In cataract with adherent iris, there may be want of motion in the latter, and irregularity of the pupil. It must be observed, however, that the pupil presents a black margin in cases of cataract; and that is to be explained by the circumstance of the white, or greyish white ground, which the opaque body furnishes behind the pupil. The margin of the aperture is black, being formed by the uvea; but as the pupil also is black in the natural state, we do not observe this black edge until some light-coloured substance is placed behind it.

BEER[*] says that the dark ring round the pupil is principally owing to the black edge of the aperture, and hence that it is most conspicuous in light irides; but he adds that the iris throws a shadow on the cataract which contributes to the appearance.

In doubtful cases the nature of the affection is sometimes elucidated by its history. Cataract forms without any uneasiness in the eye or in the head, or any disturbance of the health; it has even been completely developed in one eye, without the patient being aware of its existence. Glaucoma and amaurosis are often preceded and accompanied by various uneasy sensations, by changes in the state of vision, which attract the patient's notice, and by functional disorder in other quarters.

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[*] *Lehre*, vol. ii. p. 281.

Various species of cataract.—There are numerous sorts of cataract; different species more or less distinguishable from each other. They vary in the seat, colour, and consistence of the opacity; in its complication with other affections of the eye, or particular states of constitution, and according to the age of the individual. An attentive consideration of these various circumstances is necessary, in reference to the choice of operation, and the chance of its success.

The difference of seat forms a natural basis of arrangement, in conformity with which, we may distinguish them into the *lenticular*, the *capsular*, the *Morgagnian*, and the *capsulo-lenticular*.

Lenticular.—The most frequent species of lenticular cataract is that called *hard* or *firm; cataracta dura* or *tenax*. In this state of the lens, the opacity has a greyish appearance, with more or less of the yellowish brown or amber tint toward the centre. In the firm and darker coloured portion, it resembles wax slightly softened by heat; the circumference is lighter coloured, and softer, being about the consistence of soft jelly. The more we see of the amber colour, and the deeper the tint, the harder is the cataract; the greyer its appearance, the softer is the consistence. What is called a hard cataract, is not in general hard throughout; the healthy lens differs in consistence, the circumference being much softer than the centre, and so it is with the opaque crystalline; the central portion is more firm than the rest. A greyish matter occupies the external part of the lens, while the centre, or nucleus, is of a yellowish colour, and much more firm. Sometimes this brownish tint occupies the whole of the pupil; and the colour of the lens has even been found of a dark brown, like the husk of the chesnut, or dark mahogany; and in these cases it is hard throughout; they are not, however, very common. An ordinary firm cataract, when extracted, presents the consistency and hardness of wax. I have never had an opportunity of seeing a cataract of a darker colour than mahogany, but WENZEL[*] and BEER[†] speak of *black* cataracts; if they mean cataracts literally black, I have never seen any such. The lens may be converted into an osseous or cretaceous substance, but such a case is very uncommon, and can hardly be said to come within the general description of the complaint; such changes have hardly been found, except when the eye has been completely disorganized. It is, at all events, very rare to meet with osseous or cretaceous substance in the lens.

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[*] *Manuel de l'Oculiste*, vol. i. p. 109. WENZEL's *Treatise* translated by WARE, in *observations on the cataract, &c.* 3rd edition, p. 50.

[†] "In very old and thin persons we sometimes find the extracted lens in a state of marasmus senilis, as hard as wood, chesnut-brown, and flattened on its surfaces as if it had been squeezed. This, which has been called by some *cataracta nigra*, is difficult to recognize before the operation, and is often confounded with amaurosis."—*Lehre*, vol. ii. p. 309. ROSAS speaks of black cataract as being a blackish-brown or blackish-grey state of the lens.—*Handbuch*, vol. ii. p. 681.

The common firm cataract, which I have now spoken of, presenting the amber tint in the middle, gradually shaded off into a grey, is the ordinary form of the complaint in advancing age. We meet with it occasionally in perfectly healthy old individuals, in whom it is a strictly local affection, the constitution being sound, and no texture of the eye altered besides the lens and capsule. The lens is generally smaller than natural, and the capsule being unaffected, the opaque body appears at a small distance behind the pupil. There is a marked interval between that aperture and the cataract; the iris has its full play, and the patient retains the power of distinguishing objects during the formation of the cataract, by the passage of light through the less opaque circumference of the lens.

There is sometimes a hard nucleus with a soft circumference, indeed so soft as almost to be fluid; this form of cataract has been called *cataracta fluido-dura.*

Lenticular cataracts are sometimes *radiated*, the opacity appearing in streaks or radii, with the intervals comparatively transparent. Those radii generally begin in the circumference of the lens; a circumstance which forms a striking contrast to the former species, in which the opacity first appears in the centre. In the ordinary state of the pupil, we can hardly see the radiated opacity, because the centre remains transparent; perhaps a small white streak or two may be distinguished; it is not until we have dilated the pupil by belladonna, that we detect the opaque streaks in the circumference of the lens. These cataracts are slow in their progress, occupying two or more years in rendering the whole of the lens opaque. I have known instances in which very little change has taken place in the lens in three years. There are some radiated lenticular cataracts, in which the radii are most distinct toward the centre of the lens.

Another species is the *soft cataract*; not soft in the circumference only, but the whole texture of the lens is changed, having various degrees of consistence. In firmness, the cataract may resemble cheese, (*c. caseosa*,) or jelly, (*c. gelatinosa*,) or milk, (*c. fluida* or *lactea*.) There are all degrees of consistence, from the hard to the fluid cataract. These soft cataracts are larger than the hard; they occupy a greater space, so that they push against the iris, make its anterior surface convex, and interfere with its motions. Soft cataracts are grey, greyish-white, bluish-white or milky, without any mixture of the yellow or amber colour. The opacity is not uniform, but presents a streaked, cloudy appearance, especially in the beginning, so that we can see into, and almost through the lens. It is equally diffused through the latter, and the discoloration is consequently equal in the whole pupil. In the fluid cataract the heavier parts may subside, so that after rest, with the pupil dilated, we can sometimes see two distinct strata, of which the inferior is the most opaque. In the commencement of this kind of cataract, there is a partial reflection of light from the central or posterior part of the lens, producing a partial yellowish and almost shining metallic appearance, varying in apparent position as the light and the eye change their relative places. As the cataract is large, the opacity extends uniformly to the circumference of the crystalline; it intercepts the light more completely than the hard cataract does; and the patient at last retains merely the power of distinguishing light from darkness.

Cataracta centralis.—The *opacity* of the lens is sometimes *partial*, being in the form of a central white or grey spot, like a pin's head; or it may occupy a larger portion of the centre, as one third or two thirds of the diameter, leaving the circumference transparent. This partial opacity is only known as a form of congenital cataract. In such cases the patient may see perfectly with the pupil so dilated, as to denude the transparent part of the lens; while he will be blind in a strong light, when the contracted pupil is completely obstructed by the central opacity.

MORGAGNIAN *cataract.*—Opacity of the fluid situated between the lens and its capsule, has been called *Cataracta* MORGAGNIANA; but I doubt its separate existence. How can we determine that this fluid is opaque and the lens transparent? Can we suppose that this fluid may undergo such change, and the capsule and lens remain transparent? I think, therefore, that in a practical consideration of the subject this kind of cataract might be safely omitted.

BEER states that the MORGAGNIAN cataract is one of the rarest species; that it exists for a short time only in its pure form, as an opacity of the MORGAGNIAN water; and that the lens itself is soon converted into a milky fluid, while the capsule generally becomes opaque. He says, that, according to his experience, it occurs suddenly, and only in consequence of the immediate influence of mineral acid vapours on the eye.[*] On another occasion he mentions, in addition to these acid vapours, those of naphtha and alcohol as capable of acting immediately and powerfully in producing cataract; and he then relates the following case: "In a woman of fifty-two I saw a pure MORGAGNIAN cataract, perfectly developed within a few hours, from exposure of the eye for not more than a quarter of an hour to a fluid of which I did not know the nature. At the urgent demand of the patient, I operated on this cataract the following day, when I found the lens firm, but perfectly transparent, as was the capsule also."[†] The particulars of this strange occurrence are not stated in sufficient detail to enable us to estimate it pathologically. There can however be only one opinion on the extraordinary practice of operating the day after the cataract appeared, and when it should seem that one eye only was affected.

Capsular cataracts (*membranacea* or *capsularis.*)—These have been divided into the *anterior* and *posterior*, in which the front or back of the capsule alone is affected, and the *complete*, in which the whole capsule is opaque. The capsule is very different in texture from the lens, and it may therefore be expected that an opacity of the former will present different appearances from that of the latter. The former does not begin in the centre, but in any part of the membrane indifferently; it is not uniform, but in spots or streaks, with less opaque or transparent intervals. These opaque portions are of a glistening chalky or pearly white, the dense structure of the capsule gives a different character to the opacity from the jelly-like substance of the lens. The position of the opaque capsule distinguishes it sufficiently from a lenticular cataract; the latter is situated at a little distance behind the pupil; there is a recognizable interval between them; but the anterior capsular cataract is on a level with the pupillary margin of the iris, and we see that the opacity is on a level with the edge of the pupil itself, sometimes passing into the aperture. The capsule cannot become extensively opaque, without the lens also being affected. There may be a single streak of opacity in the capsule after iritis; but that does not constitute a cataract: the capsule may be more extensively but yet partially covered by a new adventitious membrane, the rest remaining clear. We know of no such case as a capsule generally opaque, containing a transparent lens.

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[*] *Lehre*, vol. ii. p. 292.

[†] *Ibid*, p. 327. In the *Repertorium* he says that he had twice seen a healthy lens with opaque Morgagnian fluid. p. 61, 62.

The posterior part of the capsule may become opaque, the anterior portion and lens remaining transparent; in this case there is an opacity situated at a marked distance behind the pupil; its situation corresponds to the known position of the capsule. We can even perceive that it presents a concave surface, and this deep-seated concave opacity is in partial streaks, the intervals of which are transparent. The small opaque striæ, with which the affection commences, are sometimes found on the circumference of the membrane, in a nearly circular arrangement, and are concealed from view until the pupil is dilated. The posterior capsular cataract has not that glistening white colour which distinguishes the anterior, because it is seen through the lens, and thus acquires a yellowish and rather dull appearance. This change in the capsule is followed by opacity in the lens; it may exist, however, a considerable time before the lens begins to lose its transparency. Although the affection is comparatively rare, I have seen many cases of posterior capsular cataract; the patients are still able to read large or even ordinary print, long after the existence of the disease has been clearly ascertained. They can see much better when the eye is shaded, or when the pupil is artificially dilated. In the latter state we see distinctly the transparent spaces between the opaque radii, through which light passes to the retina. When opacity of the lens commences, which may not be for two, three, or more years, vision is more seriously impaired.

The existence of *perfect capsular cataract* cannot be easily ascertained; for if the anterior portion of the membrane be opaque, it will prevent us from knowing whether the posterior be so or not. With a slight opacity of the anterior, it may be practicable to see also the opaque posterior part of the capsule. But the lens will participate in the affection, and the case may be considered as a capsulo-lenticular cataract.

A membranous or capsular cataract often remains when the lens has been absorbed, as in traumatic cases, or after needle operations, when it constitutes a form of secondary cataract. The opaque membrane is of a chalky or milky white according to its density; the opacity may be so inconsiderable, as to present a difficultly distinguishable film; it is usually unequal in degree in different parts. The surface is sometimes more or less irregular. This opaque membrane is generally near to the pupil, the margin of which is often adherent at one or more points. The opaque body may fill up the entire space behind the iris, its circumference being connected to the ciliary body, or it may be deficient, in a greater or less extent, from laceration, or detachment at its circumference. According to these varieties, there may be either good vision or loss of sight.

Capsulo-lenticular cataract.—The *capsulo-lenticular* is a very frequent form of the complaint. Partial capsular opacity is not unfrequently combined with firm lenticular cataract: the two strata are readily distinguished, not only by their colour, but also by their position. More commonly the lens is soft in capsulo-lenticular cataracts, and the capsule itself, having been the seat of disease, is more or less thickened and indurated. Hence the cataract is generally large, often pushing forwards the iris, and making it bulge against the cornea, so as to destroy for the time the anterior chamber. In these cases these is a combination of circumstances, which cannot fail to point out the nature of the cataract. The streaky appearance of the anterior portion of the capsule is seen on a level with the edge of the pupil; and we distinguish the opaque lens of a different tint through the less opaque portions of the capsule. As the lens is large, and as both it and the capsule are opaque, vision is completely lost, except the mere distinction of light from darkness. The motions of the iris are often impeded by the bulk and mechanical pressure of the cataract.

The capsulo-lenticular cataract is frequently caused by a chronic and almost insensible inflammation, or at least determination of blood to the eye, accompanied not unfrequently with symptoms of congestion in the head. Under this disturbance of the circulation, the colour of the iris is sometimes altered, and the capsule undergoes changes from insterstitial deposition, or from effusion of lymph on its surface, which lead to peculiar subsequent appearances. These vary greatly in different instances, and have been named as if they were so many distinct species of cataract; there is the *c. marmoracea*, or *variegata*, with a marbled appearance; the *c. fenestrata*, with bars compared to those of a window; the *c. striata*, or streaked cataract; the *c. stellata*, the *c. punctata*, with spots of the capsule, and so on.

In severe purulent ophthalmia, especially in infants, the inflammation sometimes extends to the capsule of the lens, and produces a single central opaque spot, *c. capsularis centralis*.

There is a *c. dimidiata*, in which one half of the capsule is opaque.

In the *c. trabecularis (c. capsulo-lenticularis cum zona* of SCHMIDT,[*] cataracte barrée of the French,) a thick opaque bar stretches across the pupil, either in the perpendicular or horizontal direction, and adheres firmly to the pupil or uvea. BEER [†] says that this cataract is produced by violent internal inflammation, and that the bar is firm, or even cartilaginous. In a boy of twelve years old, in whom he extracted such a cataract from each eye, the bar was of osseous texture, and the capsule, which was almost cartilaginous, contained a small firm nucleus of lens.

In the *c. pyramidalis* a dense opaque mass of pyramidal figure projects into the pupil.

It not uncommonly happens, that the lens begins to be lessened in bulk by a natural process of absorption; and in proportion as it shrinks, the capsule contracts upon it, and shrivels up. This shrunk capsule, which is much thickened and corrugated, more or less separated from the ciliary body, and containing a diminished or small lens, is called the *cataracta arida siliquata*, or the *dry shelled cataract*, although no cataract can be dry, in the proper sense of the term. [‡]

In some instances, where the opaque state of the lens and capsule is combined with other affections of the eye, the latter not only shrinks up, but becomes detached from the ciliary body, so that a clear black margin surrounds it. In this state, it may oscillate backwards and forwards when the eye moves (*c. tremula*, or *shaking cataract*;) it may even become quite loose, floating behind the iris, or passing into the anterior chamber (*c. natatilis*, *swimming* or *floating cataract*.) In the latter case there is generally a tremulous motion of the iris.

There is a *cataracta gypsea*, or a change of the capsule into a kind of cretaceous substance; it forms a thin kind of shell, brittle, and of a yellowish hue.

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[*] *Ueber nachstaar und iritis*, p. 21.

[†] *Ibid*. p. 502.

[‡] This name was given to the cataract in question by J. A. SCHMIDT, who represents that it is found in young persons who have suffered from convulsions in infancy. He ascribes to the convulsive movements of the eye that partial separation of the capsule at its circumference, to which he refers the peculiarities of the cataract. The *cataracta arida siliquata* occurs in young subjects, and as a congenital affection; but I have not traced the action of the cause mentioned by SCHMIDT. *Ueber nachstaar und iritis*, p. 20.

Under the name of *c. capsulo-lenticularis cum bursa ichorem continente*, BEER[*] and SCHMIDT[†] have described a cataract of yellow colour, in which a cyst of matter, sometimes stinking, is found between the lens and the posterior portion of the capsule. If the capsule be extracted, this cyst comes out of the eye entire, "containing," says SCHMIDT, "a thick yellow badly smelling ichor." He observes, that extraction is always followed, in these cases, by iritis and loss of sight, and that such was the result in eight cases in which he operated. I have never seen this cataract, and BENEDICT states that he has not met with it.[‡]

The varieties now described arise from the partial and irregular distribution of the newly deposited substance which causes the opacity, from partial thickening of the membrane; or from adventitious external deposits on its surface during inflammation, becoming afterwards organized. These changes for the most part render the capsule thicker and firmer than in the natural state. Hence in operations it is tough, and resists the knife, so that we often find a difficulty in dividing it.

Varieties of colour.—The lens may lose its transparency in consequence of internal ophthalmia, and present appearances more or less similar to those I have already enumerated. It may be of a dull green, a yellowish green, or a brighter yellow colour; sometimes it is of a dirty white. All such cataracts are the consequences of internal disease of the organ, and in that respect are to be distinguished from those changes in the lens and capsule which are not preceded or accompanied by other diseases of the eye. In the latter, or cases of simple cataract, the colour of the opacity, according to the foregoing description, is grey, yellowish grey, or greyish brown, to dark brown, milky or chalky white, sometimes pearly or silvery.

In young persons, the cataract is almost invariably white or grey; generally of milky or bluish white tint. When a brownish or yellowish state of the lens is seen in a young person, it may almost certainly be ascribed to internal disease of the eye; for example, to the commencement of the medullary fungus; although a similar colour in an old person would not indicate the existence of any such disease.

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[*] *Lehre*, vol. ii. p. 301.
[†] *Ueber nachstaar*, p. 20, 21.
[‡] *Handbuch*, vol. iv. p. 64.

Varieties in consistence.—The varieties of consistence in cataracts are of great practical importance, as they principally determine our choice of operation. The firm lenticular cataract is the only one to which the epithet *hard* can be properly applied; the lens is never found osseous in cases that admit of operation. The consistence of the lens in this form of the complaint, is too firm to admit of its being divided or broken by the needle; and it undergoes absorption so slowly, that its removal by that process is extremely tedious. The *cataracta gypsea* may be enumerated among the hard; and several of the capsular, or capsulo-lenticular cataracts are at least dense and tough, so as not to be easily torn or cut by instruments employed within the eye. The caseous and gelatinous cataracts form a transition from the hard lenticular to the milky, which is quite fluid. The needle moves freely through the gelatinous lens, which is milky white; and the crystalline is found in this or in a fluid state in infants, and in young persons to the age of twenty or thirty.

Mature and immature.—Cataracts have been distinguished as *mature* and *immature*. The former term may be used when the change is fully developed, according to the nature of the case. This distinction, however, has been made chiefly in reference to the time for operating; and a common notion prevails, that the operation ought not to be done till the cataract is ripe. This opinion is not altogether unfounded; certain cataracts are the result of vascular congestion, if not of inflammation, and in these cases it is unfavourable to operate early. We should wait until the change has been completed, and until all symptoms of fulness are at an end.

Complications.—Cataract may be purely local, the morbid affection being strictly confined to the lens and capsule; it may be accompanied with various affections of other parts of the eye, particularly of the iris and pupil, the vitreus humor, and retina; or it may be complicated with unhealthy states of constitution. According to these differences, cataracts may be characterized as *purely local*, *locally complicated*, *generally complicated*, *complicated locally* and *generally*. These points must be carefully inquired into before we can recommend an operation, or determine what mode of operating may be most advisable.

Adhesions of the pupil.—When we consider that the uvea, if it does not touch the capsule, is separated from it only by the thinnest pellicle of fluid, and that the capsule may become inflamed, thickened, or covered by an effusion of organizable lymph, we can easily understand how adhesions may be formed between it and the uvea or pupillary margin. Such preternatural connexions take place in traumatic cataracts, and still more in those consequent on acute internal ophthalmia. In the latter, the capsule is covered by a thick tough adventitious membrane, which is the medium of a close general union between it and the uvea. The adhesions consequent on inflammation may be partial or general, and they are often accompanied with change of colour in the iris. The same internal ophthalmia which has produced these effects, will generally be found to have caused change of structure in the retina, with great injury, or loss of sight. For this reason considerable or general adhesion is an unfavourable complication. Indeed adhesions, under all circumstances, produce more or less difficulty in operations. We sometimes see slender partial adhesions by dark threads, from which we infer that there has been a slight degree of inflammation, although it may not have been manifested by other signs. The large soft cataract, which pushes forwards the iris, is not usually adherent. Opacity of the capsule is frequently combined with adhesion, but not necessarily so. The pupillary margin is sometimes connected by one or more slender dark threads to a capsule apparently clear.

Glaucoma.—Cataract may be combined with glaucoma; and this is a combination of which we can hardly be aware, unless we have seen the case previously to the occurrence of the cataract. The glaucoma occurs first, and the lens is affected subsequently; but a careful examination of the history of the case will generally lead us to discover the previous existence of disease in the vitreus humor and retina. If the iris is altered in colour, if the pupil is dilated, and fixed in the dilated state, if the sight was lost with considerable head-ache and pain in the forehead, and if it was gone before the cataract formed, we may fairly infer that the eye is glaucomatous.

The existence of synchisis in conjunction with cataract will be shown by a tremulous state both of the iris and cataract, by softness of the globe, and complete loss of vision. BEER,* however, says that he has extracted tremulous cataracts with a large efflux of fluid vitreus humor, and recovery of sight. Of course an operation should not be performed, unless there is clear evidence that the retina is sensible.

Amaurosis.—It is not uncommon to have cataract complicated with amaurosis: in these cases, the amaurosis will be indicated by the complete state of blindness, by the patient not being able to discern light from darkness. This, however, is only seen in complete amaurosis: imperfect vision may remain, the sensibility of the retina being impaired, but not wholly destroyed. We must attend to the symptoms under which the loss of sight has occurred, as well as to the present state of the eye. Simple cataract comes on without pain, while in amaurosis there is often considerable pain in the head, or neighbourhood of the eye, and generally more or less uneasiness. In cataract the iris has its natural power of motion; while in amaurosis the changes in the pupil take place imperfectly, or are suspended, and the opening itself is often dilated. A motionless iris, therefore, would excite suspicion, and lead us to examine the case minutely, if it should be observed where the cataract is not large, and the pupil unadherent. A dilated state of the opening would be an additional evidence of amaurotic affection. We shall generally derive assistance, in estimating the state of the retina, from comparing the two eyes. It seldom happens that both are affected in the same degree; the earlier stage in one eye may throw light on the more advanced complaint of the other.

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* *Repertorium*, vol. i. p. 61.

Varieties dependent on age.—All ages are subject to cataracts; children are even born with them, and they may occur at any age from infancy to the remotest period of life; perhaps elderly persons are most subject to the complaint, especially at the age of fifty, sixty, or upwards. Cataracts are never hard in the young; we never meet with a hard lens below the age of puberty; they are not always hard in old persons: we may have soft cataracts in the old, and hard ones in the middle period of life.

The complication of cataract with diseases in other parts, and with unhealthy states of constitution is obvious enough. The latter is an important point in reference to operation and its results. We must proceed very cautiously with the gouty, for fear of iritis.

Causes.—The well-known effect of inflammation, in producing opacity of parts naturally transparent, would lead us to expect that inflammation is a common cause of cataract. In some instances it is obviously the result of inflammation; internal ophthalmiæ will produce opacity of the lens and capsule; arthritic inflammation of the posterior tunics will render the lens opaque. Wounds of the lens and capsule produce opacity of these parts, and as such injuries generally give rise to severe inflammation, it might be inferred that traumatic cataract could be traced to the inflammation produced by the wound. The opacity consequent on a wound may, however, occur without any evidence of inflammation. Soft capsulo-lenticular cataracts often form in consequence of congestion in the organ. Their formation is attended, in many instances, with all the signs indicating an unusual determination of blood to the head, and general fulness of the system. We cannot, however, generalize the observation, and say that inflammation is invariably the cause of cataract; we cannot suppose that inflammation has produced the cataract which we see in new-born children. We see that cataracts are common in old persons of healthy constitution, who are not sensible of any uneasiness in the organ, in whom there is no appearance of vascular excitement, nor any other disorder. We cannot refer the change to inflammation, and we must acknowledge that the cause has not hitherto been satisfactorily elucidated in such instances. In fact, the nutrition of the lens, the mode of its connexion with the surrounding parts, and its manner of growth, are not understood. The lens undergoes some natural changes in age; its convexity is lessened, and it loses that colourless transparency which distinguishes it in the early and middle periods of life. Its nucleus is of a slight yellow colour at thirty; the tint gradually becomes deeper, until the lens resembles a portion of amber at seventy or eighty. In many cases of cataract, the direct cause of that particular change in the lens is unknown. Neither do we know that any peculiar state of constitution is favourable to its development.

Treatment.—General or local measures may occasionally alleviate particular symptoms, or remove concomitant affections, but they have no influence whatever on the cataract, absolutely none. It may be asserted, without any qualification, that no external application nor internal medicines with which we are at present acquainted, can alter the condition of the opaque lens and capsule. When lymph has been effused upon the capsule, as in iritis, its absorption may be effected, while it is still recent, by proper means; but what I am now speaking of, is the opacity of the capsule and lens constituting cataract, which cannot be changed by any treatment hitherto discovered. We must then come to the operation, as the only means of restoring vision in such cases. However, as the state of the eye, in other respects, is so various, and as these several complications of cataract materially influence the chances of success from operation, we must, in the first instance, inquire carefully into all the particulars of the case, to ascertain whether complete or only partial success may be expected, or whether there is no reasonable prospect of benefit.

Prognosis.—The prognosis is completely favourable when the affection is confined to the lens or capsule; when the sensibility of the retina is undiminished: when the motions of the iris are unimpaired; when the constitution of the patient is sound, and the health is good at the time of operating; and when the patient is of a spare rather than a full habit. Under these circumstances the prognosis is completely favourable; supposing the operator to understand the subject well, to select the kind of operation most suited to the particular species of cataract, and to possess sufficient manual dexterity for performing it in the most advantageous way. The prognosis is particularly favourable in congenital cataracts, in those of young persons, in whom, however, it seldom arises except in consequence of injuries, and in the firm lenticular cataract of elderly persons.

It is bad when the cataract is complicated with glaucoma or amaurosis; with a fluid state of the vitreus humor; with a varicous condition of the blood-vessels; with dropsy of the eye, or with a contracted or closed pupil. Indeed some of these circumstances would form decided objections to the operation. It is also bad when the cataract has been preceded or accompanied by severe pains in the head, or in the eye, by muscæ volitantes, sparks or flashes of fire before the eye; as all these circumstances indicate affection of the nervous structure.

The prospect is doubtful when cataract is the result of internal inflammation of the eye, or of that vascular disturbance which comes under the head of congestion.

Adhesions of the pupil are unfavourable, since the laceration and removal of them may excite inflammation in the iris and internal tunics, particularly in gouty individuals, in whom such adhesions are most frequent, and who are the most likely to suffer from inflammation after the operation. The prognosis is doubtful in cases of cataract affecting one eye, when the other is amaurotic or glaucomatous. If amaurosis or glaucoma should have occurred in one, there is great probability that the other may be affected in the same way. Before advising an operation in such a case, we should satisfy ourselves fully that the retina is sensible; we should carefully prepare the patient for the operation, and speak doubtfully of the result. If the evidence respecting the sensibility of the retina be not clear, it is better not to advise an operation, but to put the patient in possession of the state of the case, and let him determine between submitting to blindness and trying the doubtful experiment of operation.

The probable result of the operation is in some measure influenced by the age of the patient; the congenital cases are particularly favourable, as inflammation seldom follows; it is easily controlled if it should occur. In young persons the risk is less than in those at the middle period of life; the latter is perhaps the most dangerous time, excepting very advanced age.

The result of the operation is so important to the patient, the question being whether he shall regain sight or not, that it may seriously involve the reputation of the operator. It is, therefore, necessary, that the most minute inquiry should be made into all the circumstances of the case, before the operation is undertaken; the history of the affection, the present state of the eye, and of the patient's health, should be well considered before advising or attempting any operation. There are some cases in which it is better for the patient to be content even with very imperfect vision, than to submit to an operation which may end in total blindness. The restorative powers are feeble in very old persons; in them, and in cases where the propriety of operating may be doubtful for other reasons, it is best to employ the palliative aid of belladonna, so long as it will procure any degree of useful vision. We should not, therefore, operate in such cases until the patient is quite blind; until his sight is in that state, in which the failure of the operation cannot make him worse. We cannot lay down an uniform rule respecting the time of operating. In general we should wait until the patient is blind, understanding by that expression, the loss of useful vision. At all events, in doubtful cases, this rule is absolute. One exception may be mentioned, viz., where the cataract is mature in one eye and immature in the other. The former may be operated on, so as to give the patient the use of that eye, while the cataract is forming in the other.

Another question is, whether we should operate when the cataract is confined to one eye; the general rule has been not to do so. The objection to operating in this case is, that the patient is no better off after, than he was before, and thus that he incurs a risk without an object. The other eye generally becomes affected sooner or later, and it will be time enough to operate then. It has been surmised that the removal of the cataract, when confined to one eye, may prevent its formation in the other. It would be difficult to prove the point; and there is as yet no sufficient proof of it before the public.

Himly[*] has questioned the propriety of the general rule. He inquires whether the occurrence of cataract in the second eye ought to be ascribed to the continued action of the cause which has produced it in the first, or whether it is owing to the sympathetic influence of the disease in the eye first affected. If the latter were the case, the removal of the cataract when it appears in one eye, might be expected to prevent the disease from occurring in the other. He quotes two instances, in which the removal of the opaque lens from the eye first affected, arrested the progress of an incipient opacity in the other eye. Beer[†] makes the following statement: "For a period of seventeen years I have closely observed those cases in which the operation for cataract had been performed in one eye, before any sign of the disease had been noticed in the other. In all such cases, I have found that the other eye has remained free from disease to the present time." In his last and great work, Beer adheres to the ordinary rule without even mentioning the other opinion. I consider that rule to be well founded, and act upon it generally. There may, however, be cases of exception; for instance, in young persons, especially females, where personal appearance may be materially affected by cataract in one eye. I have operated in some such cases, proceeding always with great caution, both as to the kind of operation, and the circumstances under which I have done it.

OPERATIONS FOR CATARACT.

Preparation of the patient.—The success of surgical operations depends, in many cases, on preventing the subsequent occurrence of inflammation, and in none is this more important than in cataract. Hence it is necessary, not only to discriminate the several kinds of cataract, and know the operation best fitted for each, but also to inquire into the patient's health, and bring it into the state most favourable for operation.

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[*] *Soll man den staar nicht operiren, so lange der kranke noch mit dem andern auge gut sieht?* in *Ophthalmologische Beobachtungen und Untersuchungen.* Bremen, 1801, p. 148.

[†] *Repertorium, &c.* vol. i. p. 29.

The question is, what kind of preparation is necessary? One rule is very obvious; that is, not to operate on a patient with a foul tongue. A clean tongue shows that the alimentary canal is in a healthy state, and consequently leads us to a favourable conclusion as to the general health. No fermented liquors, and generally no animal food should be taken for a week or fortnight previously; and the bowels should be evacuated by some mild aperient every other day during this time: they should also be well cleared on the morning of the operation. These remarks will apply to all cases; and, generally speaking, this is the only preparation necessary. Some patients, however, require other preparatory measures; in plethoric subjects, and such as manifest great determination of blood to the head, direct depletion is necessary. In robust persons, in those about the middle period of life, it will be necessary to resort to venesection; and if the pulse were full, and the patient young and strong, it might be advisable to take blood freely and repeatedly before operating. In general it is sufficient to take some blood from the arm, on the morning of the operation. In those of a plethoric habit, with symptoms of determination to the head, we must practise active depletion; and this is occasionally necessary even in old persons. I remember the case of a woman, seventy years of age, who had amaurosis of one eye and cataract in the other; she was corpulent, with a full, bloated, and reddish countenance. She complained particularly of what she called weakness and nervousness, which she had endeavoured to counteract by the free use of animal food, porter, and other stimulants. She had considerable head-ache, with trembling hands and infirm legs; she was bled from the arm, the blood being strongly buffed, and cupped. The head-ache and the nervousness were diminished by the bleeding, and she felt stronger. I kept her fourteen days before she was in a fit state to undergo the operation; and during that time she was bled four times, the three first portions of blood being buffed, and cupped, and the last free from these appearances. In addition to this direct depletion she was well purged, and kept on broth and gruel, with bread. After a fortnight's discipline of that kind I operated on the eye, and extracted the cataract, from which she recovered without one untoward symptom, and regained excellent sight. Another patient, who exhibited the highest degree of general plethora and particular determination to the head, was obliged to lose nearly 120 ounces of blood before he was in a fit state for the operation. He had not an uneasy feeling afterwards, and his recovery was rapid and perfect. These are examples of the preparatory measures which it may be necessary to adopt in particular instances. The great risk of failure is from the occurrence of inflammation; and in a matter of so much consequence, it is better to err on the side of caution. In some cases I have regretted that I had not attended sufficiently to these preparatory measures; but I have never seen reason to consider them superfluous or injurious.

The next point for consideration is the choice of the operation. From the time of CELSUS, in whose work we find the first account of an operation for cataract, until the last century, only one method was practised, that of introducing a small needle into the eye behind the iris, and pushing the lens downwards out of the axis of vision. That operation, inasmuch as it displaces the lens downwards, has been called *depression;* it is also called *couching.* It is accurately described by CELSUS, and his manner of performing it is nearly the same as that now practised. About the middle of the last century it happened, in consequence of an opaque lens having escaped through the pupil into the anterior chamber, that DAVIEL, a French surgeon, thought of making a cut through the cornea to let it out, which he did. Hence he was led to propose and practise generally this method of removing an opaque lens from the eye, which has since been called *extraction,** and much improved. This operation consists in making an incision through the cornea, lacerating the crystalline capsule, and forcing the lens out through the pupil and the opening made in the cornea. When this operation was introduced, a controversy arose as to the merits of the two operations, extraction and depression, each of which had its warm advocates. The writers on this part of surgery have frequently drawn up, in parallel columns, the advantages and disadvantages of the two methods, and have usually endeavoured to demonstrate the general superiority either of extraction or depression, as if it were necessary to choose one or the other, and practise it exclusively. More recently a third mode of operating has been introduced, and extensively employed, in which the lens is neither extracted nor depressed, but disturbed or divided, and left in its place to be removed by absorption. It is called the operation by *solution* or *absorption.* In this latter mode of proceeding, the needle may be either carried through the cornea and pupil, or be introduced behind the iris, as it is in the operation of depression. These two methods are distinguished by the names of the *anterior* and *posterior* operations. No person, who understands the subject, would advise any one operation to be employed exclusively. Each method has its advantages, and is eligible under certain circumstances; our object then should be, not to select one operation with the view of practising it in all cases, but to consider the circumstances which give a preference to one or the other, and to select in each instance that which is best suited to the particular form of the complaint.

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* It seems probable that the Arabians were acquainted with extraction. At all events it is certain that the operation had been performed in France, long before the time of DAVIEL. MERY gives an account of its performance by J. L. PETIT in 1708. *De la Cataracte et du Glaucome*; par M. MERY; *Mem. de l'Acad. des Sciences*; 1708, p. 241. The honour, however, of expressly proposing extraction, as a regular operation for cataract, and of introducing it into practice, belongs undoubtedly to DAVIEL, whose proposal, communicated to the Academy of Surgery, is printed in the second volume of their memoires; *Sur une nouvelle methode de guerir la cataracte par l' extraction du cristallin.*

SECTION II.—EXTRACTION OF THE CATARACT.

I shall first describe the operation of extraction. I think it best to operate on one eye only at a time. If we restore sight in one, it is sufficient for all useful purposes, and the patient will generally be satisfied: the other may be operated on afterwards, or be retained as a reserve in case the restored sight should fail, or be lost by disease or accident. When both are operated on together, they are not necessarily involved in any unfavourable subsequent occurrences; yet they are likely to suffer together from common causes, and under such circumstances the patient loses all chance of regaining sight. On the other hand, if things go on unfavourably, it is a great consolation both to the patient and surgeon to know that one eye only is risked.

Extraction may be performed with the patient either sitting or lying: it has been more common to perform it in the former posture. In the operation of extraction it is necessary that the patient should be seated opposite a window which affords a good steady light; a northern aspect is preferable, or at all events, a window should be chosen which does not admit sunshine. If it afford a good light, it is better to have only one window open. The patient should not be seated exactly opposite the window; because the light will be reflected from the centre of the cornea, so as to prevent a clear view of the point of the knife, in its passage across the anterior chamber; to prevent this inconvenience, he should be placed a little obliquely, with the eye to be operated on rather nearer to the window. He should be seated on a chair or stool, rather lower than that occupied by the operator, that the latter may have the free and easy use of his hands and arms, without being obliged to elevate them unpleasantly. The patient may be placed on a seat either with a back or without one; a chair with a sliding back is convenient; it can be adjusted to the height of the patient, who rests his head firmly against it. I think this a preferable mode to that of fixing the head of the patient against the breast of an assistant; it can be more depended on for steadiness. The operator easily adjusts his own height by sitting on a music stool, or placing one or more books on the seat of a common chair. He places his legs one on each side of the patient, and if he should wish to give additional steadiness to his arm and hand, he may rest his elbow on his knee, raised to a proper height by placing the foot on a stool by the patient's side.

The duty of the assistant is to fix the head, to keep it perfectly steady, to elevate the upper lid, and to keep it elevated, without pressing on the globe, while the section of the cornea is made. If a chair with a sliding back be employed, all the assistant has to do is to elevate the lid; otherwise, the assistant must fix the patient's head against his own breast by one hand placed under the chin, while he elevates the lid with the other. The assistant should be aware of one point, which should be decided upon between him and the operator before the operation is commenced, namely, to let the lid go before the section of the cornea is completed; and the operator should just give a sign or motion to the assistant as soon as he has nearly finished the section. In elevating the upper lid, one finger is generally sufficient; let the assistant fix the lid against the upper margin of the orbit, the end of the finger being placed on the ciliary margin of the lid: he should firmly hold it against the orbit, until the operator tells him to let it go. It is not material whether the assistant employs his right or left hand; but it will be less in the way if he employ the hand opposite to that which the operator is using. It has been the general practice to bind up the opposite eye, and that was recommended even by CELSUS; I believe it is a matter of little consequence. It has been said that if you keep the opposite eye quiet, that which is operated on will remain still also; but I do not find that to be the case. I have found that the best way is to leave the opposite eye open, and direct the patient to look steadily at an object so situated as to bring the eye into a convenient position for the purposes of the operation.

Various instruments have been devised for keeping the eye steady, specula of different shapes; they are now entirely abandoned, as not only inefficient but absolutely injurious. Some of these instruments have been made with little hooks intended to be stuck into the sclerotic coat. Figures of such are to be found in RICHTER's elements of surgery, and in other works. I can conceive nothing more calculated to alarm the patient, to increase spasmodic action of the muscles of the globe, and thus to render the eye unsteady. Hence all contrivances of this sort are now laid aside, and the operator trusts to his own fingers for giving to the globe the necessary degree of steadiness. In accomplishing this point he must act merely on the anterior part of the organ, taking care that no general pressure is made on the globe either by himself or his assistant. Such pressure is most injurious, both by pushing the iris forwards against the cornea, and prematurely forcing out the aqueus humor, and also by endangering the premature and forcible expulsion of the lens, with the vitreus humor.

The operation of extraction consists of *three parts*, the division of the cornea; the laceration of the capsule; and the removal of the lens through the openings made in the capsule and cornea.

The division of the cornea must be ample enough, that the lens may escape readily through it; we divide, therefore, a certain portion of the circumference, carrying the section along the edge of the cornea, as near as may be to the sclerotic coat. There are various reasons for making the section at the margin of the cornea, and the principal of these is, that the subsequent cicatrix will not interfere with vision. The section of the cornea must embrace an extent corresponding to the transverse diameter of the lens, and that is nearly equal to the diameter of the cornea itself, so that the section of one half of the cornea is required to allow the lens to escape. We have to divide the inferior half of the cornea; we must puncture it on the temporal side of the eye, carry the knife across the anterior chamber, bring it out at the nasal side opposite to its entrance, and then continue the incision downwards, so that the knife may cut itself out. The chief difficulty in the section of the cornea arises from the iris getting in the way of the knife. When the anterior chamber is penetrated, the aqueus humor readily escapes, and then the iris comes immediately against the knife, so that we cannot carry it on without wounding that part. In order to prevent the escape of the aqueus humor, the cornea knives are so shaped as to fill up the wound; that is, they increase in thickness gradually from the point to the handle.

A great variety of knives has been employed: the operation is undoubtedly difficult, and a hope has been entertained of removing or lessening the difficulty by some peculiarity in the instruments. We need not expect to overcome the difficulties inseparable from the operation by mechanical contrivance. One knife may be better calculated for the purpose than another, but a beginner will not find the operation easy with any instrument, and dexterity can only be acquired by repeated practice. The particular form of the knife is perhaps of no great importance. The method of DAVIEL is not employed now; he, with a sharp pointed knife, made a division in the lower part of the cornea, and then introduced a small scissars so as to enlarge the opening; the latter proceeding is never resorted to now, except in cases of necessity.

Lancet-shaped knives have been most commonly employed, of various breadths; such were used by RICHTER, WENZEL and WARE. The knife first used by BARTH, the founder of the Vienna School of Ophthalmic Surgery, and now more commonly known as BEER's knife, is of triangular shape, straight on the back, with an oblique or slanting cutting edge, and gradually increasing in breadth as well as thickness, from the point to the handle. In my opinion it is the knife best adapted for the extraction of the cataract. It is ground lancet-shaped at the point, by which means it enters the cornea more readily; but it is blunt in the rest of the back.*

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* Dr. F. JAEGER, of Vienna, has devised a new cornea knife, by which he proposes to obviate the inconveniences and dangers experienced in the ordinary mode of opening the cornea. The instrument is described and delineated by Dr. LOUDON, in a quarto pamphlet, entitled *A short inquiry into the principal causes of the unsuccessful termination of extraction by the cornea*, &c., 1826. The instrument consists of a BEER's knife fixed to a handle, and of a smaller blade connected to the other by a button screw, so that it can be pushed forward upon it, or withdrawn. This knife is introduced, carried across the eye, and through the cornea

In making this incision of the cornea, four points are to be attended to, viz. puncturing the cornea, carrying the knife across the anterior chamber, the puncture of the cornea at the opposite side, and lastly, the completion of the section downward. In entering the instrument at the temporal side of the eye, we must be careful to carry the point of the knife directly through the cornea, not obliquely. The knife may go between the corneal laminæ without entering the anterior chamber; or they may be cut so obliquely, that the inner line of the section will be much smaller than the outer, and consequently there will not be sufficient room for the cataract to pass easily. I should have before observed that the knife is to be held between the two first fingers and the thumb, just like any other knife. The hand is to be rested on the cheek with the two other fingers half bent, and the section of the cornea is performed by carrying the knife on with an extension of the fingers, not by moving the whole hand. To divide the corneal laminæ perpendicularly, we must carry the point of the knife, when we make the first puncture, in the direction of the iris, as if we were about to carry it directly against the iris, until we get completely through the cornea; then turn the point of the knife and carry it on with its flat surfaces parallel to the iris, across the anterior chamber. The more quickly this is done, the less chance is there of the escape of the aqueus humor. One great difficulty in performing the section of the cornea is this; when the point of the knife reaches the opposite side of the eye, the ball is involuntarily turned inward towards the nose; to counteract that, we must employ a little pressure with the fore finger; depressing the lower lid a little, and steadying the globe at the same time, to prevent the eye from rolling inwards while the knife is carried through the anterior chamber, and opposite side of the cornea. Unquestionably the unsteadiness of the eye, the motions which a person involuntarily makes, are great impediments to the performance of this operation. We must not be afraid of touching

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on the opposite side, in the same way as Beer's. By pressing on the button with the thumb, the smaller blade is now pushed forwards, so as to complete the section of the cornea, while the globe is kept steady by the fixed blade.

From the contemplation of this double knife, Mr. Guthrie was led to construct another of a blunt silver blade, and a lancet-shaped knife to slide along it. He makes an opening in the cornea with a large Wenzel's knife; he then introduces his double knife with the blunt silver blade towards the iris, and the cutting-blade retracted; he carries it across to the inside of the cornea, and then presses forwards the cutting-blade so as to complete the section of the cornea.—*Lectures on the operative surgery of the eye*, second edition, p. 344, plate 6.

the globe, but fix it firmly between the fore and middle finger, just while we are entering the knife, and carrying it across; when the point is brought out, there is no further difficulty in completing the section. Puncture the cornea, and traverse the anterior chamber quickly and steadily, keeping the eye on the point of the knife. It may be well to touch the cornea slightly once or twice with the flat surface of the knife, just before beginning the section, to give the patient warning, and to induce him to keep the organ as steady as possible. Having entered the knife and carried it across the anterior chamber, and having brought it out at the nasal side of the eye, we then push it gently onwards, without any remission, towards the nose, and the breadth of the knife should be such that it may cut its way out; but we generally find that a small portion of the cornea must be divided by a downward motion, unless we push it onwards, so as to wound the nose or the internal canthus; it must be done by a gentle sawing motion of the knife, immediately upon which the lid should be allowed to drop: it is safer, however, for the upper lid to fall before this last part of the section is completed, and to wait a few seconds before attempting the cut, that every spasm of the muscles may subside.

Some recommend that the knife should be withdrawn before the cornea is completely divided, and that the section should be finished with a narrow curved knife. It would be better to do this than to run the risk of wounding the iris.

The object we have in view, is to make a clean cut of the cornea by one single incision, employing only one instrument; we thus accomplish the purpose in a manner the most favourable to subsequent speedy union. I have already observed, that the presence of the iris affords the principal obstacle to the easy and exact execution of this important step in the operation. The preparatory measures of fixing the lids and exposing the globe, and the act of cutting this very sensible part, bring on a spasmodic action of the muscles, both of the globe and lids, by which the aqueus humor is quickly expelled, and the loose floating iris pushed against the knife, or even propelled, so as to bulge under its edge. If this should happen when the point of the knife has traversed only half, or even the whole anterior chamber, and the point should be completely enveloped by the iris, it will be best to withdraw the instrument, close the eye, allow the section to heal, and repeat the operation afterwards. But, if we should have carried the knife not only across the anterior chamber, but through the nasal side of the cornea, the iris may then be forced under its edge; we may complete the section without withdrawing the instrument, although we must not immediately press it forwards, as we should then shave off a piece of the iris. It is better to rest for a few seconds, that the spasm may subside; gently press the iris back with the fore-finger, and, keeping up the pressure, slowly complete the section. As the knife advances, its broader portion enters the anterior chamber; thus the chance of protrusion is diminished, by lessening the space in which it can occur.

When the section of the cornea is finished, it may not be large enough to allow the easy escape of the lens. A common cause of failure is in bringing the point through the cornea, before it has reached the inner edge; and this arises from the rolling of the globe inwards. We see cicatrices, in which we find that the knife has come out only a little beyond the centre of the cornea. It is most desirable to make the opening of full size at first; that is to divide one half of the cornea close to its circumference. When, however, this is not accomplished, what course should be taken to remedy the failure? Scissars curved on the edge, and with one blade blunt at the end, have been employed. They were regularly used in the method originally proposed by DAVIEL, who merely punctured the cornea with the knife, and did the rest with the curved scissars. The contused wound thus made is less favourable for union by adhesion. The mode now most commonly employed, is to use two small narrow curved knives, with rounded blunt ends, one of which cuts on the convex, and the other on the concave side. With one of these, the section of the cornea may be enlarged when necessary. This method is sometimes used as the regular way of operating; a partial section of the cornea is made with a broad knife, carried across the anterior chamber, but not brought out on the other side; it is then enlarged in any eligible direction, with one of these curved knives. When the section of the cornea is finished, the great difficulty of the operation is passed; the rest is quite easy. All that remains is to rupture the capsule of the lens. The lens might be forced out without previously opening the capsule; but the vitreus humor would probably be expelled with it.

The capsule is generally lacerated by an instrument called a curette, which is curved, and has a pointed extremity. It is introduced under the flap of the cornea, with the convexity turned upwards, till the point is opposite the pupil; we then turn the point inwards, sink it through the capsule, and draw it from side to side, so as freely to divide that membrane, and withdraw it with the convexity of the instrument downwards.

The third part of the operation is the removal of the lens; this is accomplished by directing the patient to open the eye, and then making a little steady and gentle pressure upon the upper lid, with the small silver spoon at the other end of the curette, while we press gently against the lower lid with the fore-finger, until the lens rises up out of its socket. The pressure must be continued gently until we see the edge of the lens rising in the pupil and distending the iris. This part of the process cannot be too slowly and cautiously performed. The iris is stretched to the utmost, and appears as if it must inevitably be torn through; but it yields gradually, and allows the largest lens to escape through the pupil. Bring the upper lid over the eye, and close it immediately on the exit of the cataract, otherwise the vitreus humor may follow the lens. Sometimes the violent contraction of the muscles forces out the lens on the completion of the corneal section, and sometimes it escapes spontaneously, when the capsule has been opened. The operation is now finished: let the eye remain shut for a short time, and then open it to see that the pupil is round and clear, and the corneal flap in the right place. The edge of the iris is often engaged in the wound; gently press on this part of the eye through the upper lid, then open both eyes to the light, and the pupil will recover; or the prolapsed iris may be replaced with the silver spoon. The after treatment of the case will be subsequently considered.

If the section of the cornea have been made in the way described, the lens will pass through it with great facility; but it often happens that a portion of the soft circumference of the lens remains behind, so that the pupil is not of its natural clear black colour. We are generally directed to remove carefully from the pupil or anterior chamber all such portions of the lens, and DAVIEL had a little silver spoon made for the purpose of fishing them out; it is generally affixed to the opposite end of the same handle with the curette. I consider this a bad practice. It is essential to the success of the operation, that the lens should be removed with as little injury to the surrounding parts as possible; the repeated introduction of instruments is obviously at variance with that object, and nothing is more likely to cause inflammation, especially of the iris, than the contact of those foreign bodies with that delicate texture. It is, moreover, unnecessary, because the soft portion of lens left behind will be removed by absorption. Then, again, little forceps and little hooks have been provided for seizing and removing portions of opaque capsule. If we were to try, we could not accomplish this, or at least not without the certainty of letting out the vitreus humor; and besides, it must be seen on a little reflection, that the opening in the capsule, which is sufficient to allow the escape of the lens, must also be large enough to admit of good vision. If there were in the pupil or anterior chamber a considerable mass of lenticular substance, and it could be removed easily, let it be done; but otherwise, make no attempt of the kind.

Sometimes the vitreus humor rises up into the pupil under the edge of the cataract; and if we were to continue pressing on the globe, that humor would be forced out instead of the lens. We must introduce the curette, and hook out the cataract. The escape of vitreus humor is not to be regarded in itself as a very serious circumstance. The space which it before occupied is filled up by aqueus secretion. There is no doubt that one-fourth or one-third, and perhaps even one-half of the vitreus humor may be lost in this way, without interfering with the result of the operation. In many instances it seems rather to contribute to success: it lessens the bulk of the globe, and takes off the tension which occasionally succeeds to the operation. Sometimes there is a spasmodic action of the muscles, propelling the vitreus humor against the cornea, and preventing the apposition of the flap. I have in such cases introduced the curette through the pupil, and let out some of the vitreus humor purposely.

It is desirable not to wound the iris; but a clean cut of this part is not in itself of any consequence. I have seen a portion of it shaved off in making the section of the cornea, a few times, without any injurious result; the case has proceeded much more favourably than it would have done if the knife had been withdrawn, and the section completed with other instruments. The pupil is afterwards larger, and of irregular figure.

After treatment.—Our object is to keep the organ perfectly quiet, so that the corneal flap may remain in apposition, and become united by adhesion. A quiet state of the eye, and of the patient in all other respects, and the exclusion of light, are necessary for the first three or four days. The coverings of the eye should be light; a soft rag doubled and wetted in water, may be gently bound on the eye by a single narrow linen band, and the other may be covered in the same way. Recollect that the eye is naturally open to the air, and that a sound eye would be heated and rendered uneasy if it were bandaged up.

The simplest bandage, which accomplishes every necessary object, consists in a narrow stripe of soft linen, which may be doubled lengthwise. The middle of this should be pinned to the back of the nightcap; each end is then brought along the corresponding side of the head, and obliquely across the eye and forehead: the two extremities, after crossing on the forehead, being pinned to the sides of the cap. The method followed by BEER, and most of the German operators, of closing the lids by strips of sticking-plaster carried from the forehead to the cheek, seems to me most objectionable.

We must not, therefore, regard it as a rule, that the patient is to be bandaged. The light covering I have recommended, is rather employed to keep the eye quiet, and guard it from any slight accident, than as a measure absolutely necessary: on the latter account it is proper to have the eye covered during the night, but it might be left open, or at least with thin wet rags only on it, while the patient is awake. The bandage should be immediately removed, if there is any feeling of heat or pain. It will be comfortable to the patient to have a soft sponge and cold water ready that he may moisten the rag occasionally. After the operation the patient should go to bed, and keep the head and shoulders rather high: the room should be darkened for the first few days; and the food should be soft, not requiring mastication, that the muscles of the face and jaws may not be called into action. The bowels should be briskly opened on the morning of the operation, so that the patient may be quiet for the next twenty-four hours, and then a mild aperient of some kind should be given, just to empty the canal without purging. If this plan of proceeding be adopted, and the patient goes on comfortably, we may expect to find at the end of four or five days that the cornea has united, and that the operation will have succeeded; and we generally find it to be so. The edge of the upper lid may then be carefully raised, and it will be a great satisfaction to the patient and to the surgeon to know that the eye is going on well; that there is no unnatural redness, no prolapsus of the iris, and that the pupil is regular. If we find none of these circumstances, and if the cornea have united, we may consider that the operation has succeeded; all covering of the eye may be laid aside, or at least it will be sufficient to pin a light rag to the nightcap, allowing it to hang over the eye, or to wear a common green shade.

We then allow the patient to get up and to sit in a darkened room, walking about occasionally, for about ten days or a fortnight more, still adhering to a low diet and attending to the bowels. If things go on favourably, he may open the eye in a weak light, and use it more freely as it becomes stronger. After some time, generally in about a month, it is expedient that the patient should be suited with spectacles; the loss of the lens diminishes the refractive power of the organ, so that it becomes necessary to supply its place by convex glasses. The patient must select those glasses with which he can see best. He will require two pairs of spectacles, one for ordinary vision, the other for reading, writing, and the other purposes in which accurate near sight is required; the latter must be more convex than the former. Some weeks should still elapse before the patient begins to use his glasses, and he should at first proceed cautiously. Indeed, he will act prudently in employing the spectacles at all times sparingly; in many cases the cataract is not the sole imperfection in the eye, and vision may decline and be lost at some length of time after the operation, without any obvious reason.

Great attention should be paid for some time to the state of bowels, the diet, and the general health; the eye should not be much used, nor exposed to strong light, nor should the patient run any risk of getting cold; the organ remains weak and irritable after the operation, and therefore liable to inflammation from slight causes.

The wound of the cornea is considerable; there is a large surface to be united and cicatrized, and numerous red vessels will be seen upon the conjunctiva and sclerotic opposite to the section; these enlarged vessels are employed in repairing the breach made in the corneal structure, just as is observed in the healing of an ulcer of the cornea.

We have supposed that every thing is going on favourably after the operation; however, we unfortunately find, as we might expect, that so large and penetrating a wound of the globe often produces serious inflammation. If the patient should not have lost blood previously by venesection, if the state of the health should not have been sufficiently attended to, or even if these circumstances have received that attention which they deserve, I make it a rule to have the patient bled to fourteen or sixteen ounces on the evening of the operation, unless there be a reason to the contrary; if, however, there should be pain of the eye, or head, a large venesection is absolutely necessary. This is a safe kind of precaution; I have never seen it injurious; but in some cases I have had occasion to regret that it was neglected.

Bleeding should on no account be neglected; and it is necessary either that the operator should do it himself, or that he should entrust it to some one in whom he can place confidence. If the pain should not be removed, or if it should recur, the bleeding must be repeated, and the further use of cupping or leeches may be necessary. The greatest attention should be paid to the patient for the first forty-eight hours after the operation, the object being to prevent the occurrence of inflammation. It will not do to wait till inflammation arises, and then adopt measures for reducing it. If this process be allowed to take place, the success of the operation is either frustrated, or rendered less perfect.

When we consider the violent distension of the iris in the escape of the lens, its exposure by the large section of the cornea, and the mechanical irritation which it sometimes undergoes from the contact of instruments used in the operation, we shall not wonder that iritis should occasionally follow the operation. It generally commences about the fourth day, with severe pain in the head; this pain is aggravated during the night, remitting in the day. The iris changes its colour, lymph is effused into the pupil, there is great sensibility to light, and increased lacrymal discharge. Closure of the pupil, or obstruction of it by an adventitious membrane, are its consequences if it is not arrested. Free venesection in the beginning, when the pain is first felt, cupping and leeches, and afterwards the active use of mercury, are the best means of combating this affection. But the latter remedy is not so efficacious here, as in iritis from internal causes.

I have described extraction as it is performed on the left eye, with the operator's right hand, the inferior half of the cornea being divided. The operation on the right eye is the same, except that the operator must use his left hand. This has been considered very difficult; but it will be found, in practising on the dead eye, just as easy as the use of the right hand; and there is no greater difficulty in the living subject.

The upper half of the cornea may be divided instead of the lower, and some prefer this plan. It is most conveniently executed with the patient lying, and a common couch serves the purpose very well, the end being about the proper height for the patient's head. The operator is seated behind the patient, and employs the right hand in operating on the right eye; he elevates and fixes the upper lid for himself, and as this almost sufficiently exposes the globe, he hardly wants an assistant. The advantages of this operation are, that the operator has a more complete control over the globe; he can fix it very perfectly; that the aqueus humor does not escape so readily, and consequently, that the section of the cornea is more easily accomplished; that there is less chance of prolapsus iridis; and that the upper lid keeps the flap of the cornea in exact apposition. For these reasons I consider the superior section preferable to the inferior. The cornea may also be divided in its exterior, or exterior and inferior portion.

One of the unfavourable circumstances which takes place after the operation of extraction, is a prolapsus of the iris. If it should be found in a few days after the operation that prolapsus of the iris exists, and if there be no inflammation, the prolapsus may be touched with the nitrate of silver, scraped to a fine point; it makes the protruded portion shrink, and excites inflammation, which produces adhesion between the iris and the corneal aperture. It has been recommended to puncture the protruded portion of the iris with a cataract needle, and let out the aqueus humor to diminish the tension of the globe, and consequent pressure upon the iris; and this is decidedly advantageous in the early stage of the prolapsus; but when that proceeding has been found insufficient, the application of the caustic pencil will be the most advantageous treatment, and it may be necessary to repeat it once or twice. If, however, inflammation should exist in the eye at the same time with the prolapsus, it must be removed by the application of leeches, and other measures: the soothing treatment, with the pucture of the prolapsed portion, is sufficient in the great majority of instances. We must proceed cautiously in the use of caustic, which is very seldom necessary or advantageous.

The operation of extraction is particularly applicable to cases of firm cataract, especially in persons advancing in years. The cataract being hard and less susceptible of absorption, is removed from the eye; the incision of the cornea may be healed in twenty-four or forty-eight hours after the operation, the object of which is then accomplished, though it would not be prudent to employ the eye at that time. Thus the advantages of the operation are the complete removal of the cataract, and the speedy restoration of sight.

Under certain circumstances, however, there are objections to extraction, whether employed for hard or any other cataracts. A small anterior chamber increases the difficulty of the operation; it is not easy to make an adequate section of the cornea without wounding the iris. The cataract is sometimes so large as to push forwards the iris, so that a very small space is left between the latter and the cornea; but as the firm cataracts are generally smaller than natural, this objection does not apply to such cases. A very sunken eye is unfavourable for the operation of extraction; and the eye may be in this state either from an absorption of the adipous matter in the orbit, or from a great projection of the brow: the globe cannot be denuded sufficiently for the easy execution of the operation, or at least not without subjecting it to pressure. A very advanced age I consider to be unfavourable for the performance of extraction; the restorative powers of the system are enfeebled, and the union of the cornea does not readily take place. I have seen some cases, in which no progress towards union was observable four or five days after the section had been made. It would be difficult, however, to specify any exact age at which we might deem it objectionable to perform the operation; we should rather consider the general powers of the individual, for some persons are as young at seventy as others are at sixty. Another objection to the operation of extraction has reference rather to the operation than to the patient; it is the difficulty of performing it, the degree of manual dexterity required for its successful execution: unless a person has frequent opportunities of operating, he will not become familiarized to the various difficulties of the proceeding, nor acquire that confidence which is essential to success. The unsteadiness of the eye, the little control which the patient has over it, the alarm which the dread of the operation, and still more the preliminary measures occasion, and the convulsive or spasmodic exertion which the actual contact of the instrument often excites, are sources of real difficulty. The eye is rolling incessantly from one side to the other, and it immediately turns away from the instrument, so that the greatest care and caution are necessary even to perform the section of the cornea. Undoubtedly extraction is an operation of considerable nicety; and unless it has been frequently performed on the dead eye, the expectation of success on the living subject would be as absurd, as the attempt would be unjustifiable. The operation of depression, on the other hand, is easy, and requires no particular practice beforehand.

Beer, who is a great advocate for extraction, mentions the following circumstances as contra-indications of the operation, and consequently as reasons for preferring depression or reclination. A considerable adhesion of the iris to the cornea. A very flat cornea, in consequence of which the anterior chamber is so small, that an opening of sufficient size cannot be made. A very broad arcus senilis, which we cannot venture to divide, because the wound will not heal. Habitual contraction of the pupil *(myosis)*. Deeply lying eyes, with narrow fissure of the lids. The eyes very unsteady, and easily thrown into convulsive movements. Excessive and insuperable timidity of the patient. Early age or great stupidity, rendering the patient unmanageable during and after the operation.[*] I have found by repeated experience, that the notion expressed above of the corneal section not healing when it has been made in the arcus senilis is incorrect.

SECTION III.—DEPRESSION, OR COUCHING.

In all instances, before operating with the needle, it is expedient to dilate the pupil by belladonna: this enlargement of the aperture enables us to see exactly what we are doing. Permanent dilatation after the operation is generally advisable, in order to allow free access of the aqueus humor to the lens, as well as to prevent adhesions of the pupillary margin. Various needles have been used for depression; the spear-shaped needle, which has been commonly employed, is made straight, and terminates at the end in a spear point. The needle employed by the late Mr. **Saunders** is straight also, but instead of being spear-pointed is ground flat at the extremity: it is just such an instrument as might be made by grinding a knitting needle flat at its end, and giving it a sharp point: the sides of the end are also sharp. The needle of SCARPA is slightly curved at the end and is sharp upon the edges of the curve. There is a needle strongly recommended by the late Mr. HEY, but it is now out of use; it is the worst of all I have tried.

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[*] *Lehre*, vol. ii. p. 364, 365.

The situation of the patient, and of the operator; the elevation of the upper lid, and the mode of fixing it by the assistant; and the management of the lower lid by the operator, are the same as in extraction.

The needle should be carried through the sclerotica, at the distance of a line and a half or two lines behind the margin of the cornea, and nearly, but not exactly, in the middle of the eye, because the long ciliary artery runs on each side along the middle; the needle, therefore, should be entered a little above the middle line. It is to be introduced on the temporal side of the globe, and then carried forwards and upwards, so as to place it on the upper and front part of the lens, and then the business of depression begins. The needle must be steadily pressed upon the cataract, so as to move it downwards and backwards, out of the axis of vision; and this to be done, not by any sudden motion, but by a slow and gentle pressure, continued until the lens sinks below the pupil. The needle should be held on the lens for a short time to fix it steadily in that position, and then lifted up a little to see if the lens rise; if it do not, the needle is withdrawn. If the lens should rise, it must be again depressed and kept down for a short time, after which the needle is withdrawn.

Reclination.—There is a method of performing this operation termed *reclination*, in which the lens is not pushed downwards in a straight direction, but is turned on its axis, so as to be placed horizontally in the vitreus humor, behind the lower part of the iris. When this kind of displacement has been effected, the posterior surface of the lens is turned downwards, the anterior upwards; the superior margin is backwards, the inferior forwards. In order to operate in that way, a particular instrument was devised by WEINHOLD.[*] It consists of two needles, which, when closed together, appear, and may be used, as a single needle. It is employed in this state to puncture the sclerotica; but when the instrument has entered the eye, and been brought in front of the lens, the operator separates the two component parts, of which the junction corresponds to the puncture of the sclerotica, and then there are two needles placed in front of the lens, by which we can completely command it and *recline* it, or place it in the situation already described. The reclination may be accomplished with the common simple needle, but the lens is apt to revolve under the needle instead of taking the desired direction. It is an operation which has not been much performed in this country.

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[*] *Anleitung den verdunkelten Krystallkörper im auge der menschen sammt seiner kapsel umzulegen*, with two plates, second edition, Meissen, 1812. Reclination had been already proposed in preference to depression by WILLBURG; *Betrachtung über die bisher gewöhnlichen operationen des Staares, sammt einer leichten und verbesserten art, dieselbe zu machen.* Nürnberg, 1785.

SCARPA's *mode of depression.*—The operation of depression as performed by SCARPA is nearly the same as that which I first described; his needle is to be introduced with its convexity forwards, the point of the needle is then carried in front of the upper part of the lens, when it is to be depressed, pushing the lens downwards and backwards; having done this, SCARPA turns the needle, and carries it quite through the front of the capsule into the anterior chamber, and makes a point of lacerating the capsule very freely, so as to let in the aqueus humor upon the depressed lens; and he advises the removal of any soft or loose fragment of the cataract into the anterior chamber.

After-treatment.—In the operation of depression, there is a punctured wound through all the coats of the eye, and a forcible displacement of the lens; the cells of the vitreus humor are lacerated, the capsule of the lens is torn, so that the internal structures of the organ are extensively injured. Although the operation at first sight appears to be simple, it cannot be unattended with the risk of inflammation; indeed inflammation is at least as common after this operation as after extraction. The inflammation too occurring in the most internal part of the organ, is generally serious; consequently the patient requires as much care as after extraction. It is necessary to pay strict attention to the state of health previously to the operation, and the treatment for the removal or prevention of inflammation must be equally active. Internal inflammation commencing in the iris, and proceeding slowly, is a common occurrence after depression; it must be treated actively by antiphlogistic measures, and afterwards by the use of mercury.

There is a further danger in depression, from the pressure of the lens on the retina. We must, therefore, be careful not to push it too far down. There is but a small space to move the needle in, and we must not depress the lens further than is absolutely necessary to get it below the pupil. Pressure of the lens on the retina would probably produce amaurosis.

When the controversy existed between the advocates of extraction and depression, among the disadvantages of the latter was enumerated the subsequent rising of the lens; and this was considered a formidable objection to depression. If such a circumstance should happen, which is seldom the case, the operation may be repeated. Depression admits of repetition; in extraction, on the contrary, the fate of the eye depends on one effort; if that fails, there is no further chance. The operation with the needle may be performed many times, and the eye will bear it without any serious injury, so that we may ultimately accomplish what we have failed to effect in the first instance.

Absorption of the depressed lens.—The old opinion that the lens, when removed from the axis of vision, and sunk in the vitreus humor, remains unchanged, so that it may at any moment, by rising up again and resuming its place behind the pupil, deprive the patient of sight, seems to have been implicitly adopted by **Beer**, who thereupon represents depression and reclination as mere palliative proceedings of uncertain ultimate result. "Depression and reclination," says he, "offer only a palliative cure in cases of perfectly hard or tolerably firm cataracts, in the cystic, and the tough membranous cataracts. For none of these are ever dissolved and absorbed after the operation, but they remain in the eye as unorganic foreign bodies, capable of rising on any occasion, and thus again destroying sight partially or completely." In a note on this passage he makes the following additional statement. "I have neglected no opportunity of examining carefully after death the eyes of those who had undergone depression or reclination during life. Some of the cases had been operated on twenty years and more previously. In almost all, I have found the firm undissolved lens generally much diminished, either with or without capsule. Membranous cataracts have been but little corrugated; they have completely lost their toughness, and been converted into a firm white mass. In a living person I saw the cataract, which had been depressed thirty years before by an itinerant operator, **Hilmer**, raised again by a fall on the head. It was small, angular, and floated from one chamber into the other when the pupil was dilated. It was successfully removed by extraction, being then nearly ossified. In 1805, I extracted for a woman forty years old, a large, hard, yellowish white lenticular cataract, which had been in the anterior chamber twenty-six years. It was displaced by a blow on the eye from the bough of a tree. I have never seen even a half firm cataract dissolved and absorbed. Before I can believe the possibility of the occurrence, I must have ocular demonstration that a depressed hard cataract can disappear."[*]

Some of the expressions in this very quotation partly admit the fact which Beer is arguing against. But the investigations made by others completely contradict Beer's statements; show that the displaced lens becomes absorbed, the process requiring a longer or shorter time in proportion to the firmness or softness of the body; and consequently prove that the fear of its rising again into its original position is altogether groundless.

Acrel[†] dissected the eye of a peasant who died some time after he had undergone depression. The lens had comcompletely disappeared.

Scarpa examined the eye in three instances after depression. "The first was in a nobleman of Pavia, aged sixty, who died precisely a year after he had undergone the operation of couching for a cataract in the right eye; the other was in a woman forty-three years of age, who died three years after depression of the cataract: and the third, in a man fifty-seven years of age, who died about three years and a half after the same operation had been performed. In the first of these three subjects, I found the crystalline deeply imbedded in the vitreus humor, and reduced to about one-third its natural size; and in the other two, in which the crystalline was deeply situated in the vitreus humor below the axis of vision, there was only the nucleus remaining of a size a little larger than the head of a common pin."[‡]

Dr. William Soemmerring has examined several eyes after the operation of depression, and has described what he found, in an interesting work,[§] to which he has added a series of beautiful figures, representing most satisfactorily the changes observed. In eight years and a half after the operation the lens had completely disappeared. In another case it was completely absorbed in three years. After two years, the firm nucleus of the lens, as large as a lentil, was found at the bottom of each eye: and it was in the same state in another eye at the end of thirteen months.

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[*] *Lehre*, vol. ii., p. 363, 364.

[†] *Chirurgische Vorfälle*, vol. i. p. 109.

[‡] *Treatise*, &c. p. 326, 327.

[§] *Beobachtungen über die organischen veränderungen im auge nach stauroperationen; mit drey steindrucktafeln.* Frankfort am Mayn, 1828.

Mr. Jules Cloquet found the crystalline reduced to one-third of its natural volume in two years after the operation.[*]

For the lens to be absorbed in these cases, it is necessary that it should be exposed nakedly to the vitreus humor. If it continue covered by its capsule, no absorption occurs. In a case where the operation had been performed three years before death, Dr. William Soemmerring[†] found the lens completely inclosed in its capsule, situated between the lower edge of the pupil and the margin of the retina, unaltered as to size, but rather unequal on its surface. Mr. Cloquet[‡] observed an analogous fact at the end of two years. The absorption of the lens is equally prevented by the presence of the capsule in the anterior chamber, as is seen in the case mentioned at p. 144. In the instance of non-absorption in the anterior chamber mentioned by Beer in a recent quotation at p. 435, the lens was probably covered by its capsule. This membrane seems to be little, if at all, susceptible of absorption.

An interesting physiological fact was observed by Dr. W. Soemmerring in his examinations; viz., that when, after depression, the capsule remains in its place, and with its natural connexions, a partial reproduction of the lens takes place. When the eyes were recent, he saw no appearance of capsule or lens; but after they had been immersed in spirit, the capsule became very obvious, and it was found to contain a varying quantity of soft gelatinous matter, analogous to the exterior substance of the lens, and rendered opaque by the spirit. Messrs. Cocteau and Leroy D'Etiolles[§] had already shown that the lens is reproduced in animals, as in the rabbit, cat, dog. This reproduction took place to a considerable extent in six weeks after the part had been extracted; but it was still more complete at the end of six months. In a rabbit killed at that period after extraction of the lens on both sides, "the crystalline capsules were perfectly transparent, and no cicatrix could be discovered: they contained crystallines perfectly similar in size and consistence to those which had been extracted. To be more certain of their nature, we plunged them in boiling water, when they became opaque, hard and friable, just like the original lens."*

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[*] *Pathologie chirurgicale*, p. 135, plate x. fig. 15.

[†] *Lib. cit.* p. 36, plate ii. fig. 5.

[‡] *Ibid.* p. 135, plate x. fig. 14.

[§] *Expériences relatives a la reproduction du cristallin*, in the *Journal de Physiologie*, tom. vii. p. 30.

The cases to which depression is best suited, are the hard cataracts in which, for some of the reasons before mentioned, extraction might not be advisable, or when the operator does not feel sufficient confidence in himself to perform the last-mentioned operation. The advantages of depression are its facility, the less degree of risk to the organ, and the power of repetition.

SECTION IV.—THE OPERATION BY SOLUTION OR ABSORPTION.

It was found by casual observation, that the lens occasionally disappeared from the pupil without being depressed. For instance, in some cases in which depression has been attempted, but not accomplished, on leaving the eye quiet for a certain time, the cataract has disappeared. Mr. **POTT** and Mr. **HEY**, who were advocates for depression, found, when attempting to operate on soft cataracts, that the needle passed through them; and they observed in these cases, in which the operation was supposed to have failed, that after a time the pupil became clear: this of course showed that absorption went on after the capsule was lacerated, and the aqueus humor admitted to the lens. Hence arose the idea of operating designedly in this manner, viz. to disturb or break the lens, and perhaps to lacerate its capsule, and then leave it for absorption. This mode was afterwards called the operation by solution; it might, perhaps, be more correctly called that by absorption. The lens is neither depressed nor extracted, but placed under such circumstances, that it disappears from the eye, being either dissolved in the aqueus humor, or taken up directly by the absorbents. It is a very useful operation, and easy of performance.

The mode of proceeding is to introduce the instrument in the same situation as for depression. We generally use a needle which cuts a little further on the sides than that of Mr. **SAUNDERS**; the only difference between that and the former being the addition of a cutting edge extending about half an inch from the point. The object is to divide the anterior layer of the crystalline capsule. If the cataract be fluid, its contents will pass into the anterior chamber, and render the aqueus humor turbid; but if it should be only soft, not fluid, we move the needle gently once or twice through it, after having freely lacerated the capsule, and then withdraw the instrument. The object is to lacerate freely the anterior capsule, without displacing the lens from its natural situation.

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* *Ibid.* p. 43.

This operation may be followed by inflammation, just as any other punctured wound of the globe; but if we proceed carefully, and are content to do little at a time, it does not excite much inflammation. The absorption of the lens goes on to a certain extent; probably some of its exterior soft substance will pass through the opening in the capsule into the anterior chamber, and then be absorbed. After a lapse of some weeks, we may operate again, if any portion of the opaque lens should remain, and we then lacerate the capsule more extensively, break up the lens into fragments, and carry them into the anterior chamber, where absorption goes on rapidly, so that the pupil becomes clear. The operation may be repeated in this way two or three times if necessary. In many of the cases, in which the greater part of the lens is soft, the nucleus is firm; and the size of this firmer portion will very much influence the time required for the absorption of it.

The points to be attended to in this operation are, first, not to displace the lens in the first operation; for if we do, it will bulge against the iris, press upon and irritate that part, and thus occasion great mischief; secondly, not to attempt too much at once, but rather to repeat the operation when the lens has been diminished by absorption, when we may make a free division of the capsule, and move the needle about more freely in the lens, and carry fragments of the latter through the pupil into the anterior chamber.

In this mode of operating the cure proceeds slowly, and several weeks or months elapse before sight is restored. The cases particularly fit for it are fluid and soft cataracts; in them it is sufficient to lacerate the capsule, and let in the aqueus humor upon the cataract. It is also applicable to caseous cataracts; and even to those of firmer consistence; but in the latter, much longer time is required for absorption, as might naturally be expected. The less inflammation is excited, the more rapidly does absorption go on. The removal even of a soft or caseous lens is often tedious; and this circumstance forms a real objection to the operation. Patients are anxious to get sight restored, and the surgeon is equally desirous of accomplishing the point. Delay is however unavoidable in this method of proceeding, in which weeks and even months sometimes elapse before the cure is finished. The only compensation to the patient for the extension of time, is the diminished risk of inflammation.

Whether the lens is removed by absorption or solution.—It is not yet determined whether the lens is removed from the chambers of the eye by absorption, or whether it disappears by solution in the aqueus humor. Removal by the absorbents is a matter of common occurrence in other parts of the body; but I know no instance in which a solid is dissolved. Analogy would therefore lead us to consider the occurrence as an exemplification of absorption. When a portion of lens is in the anterior chamber, no changes occur in it like the action of a solvent; nor is the transparency of the aqueus humor affected. The solvent action, if it be such, is very different from ordinary solution; for fragments of lens lie in the supposed menstruum often for weeks or months with little change. Sometimes, however, the lenticular substance gradually wastes and is removed at points where it is not in contact with any surface, as in the case of a fragment protruding through the capsule and pupil into the anterior chamber, also on the upper surface and sides of fragments resting in the bottom of the chamber.

However the process is effected, it goes on more actively, and is therefore accomplished more quickly in the anterior than in the posterior chamber. In the course of the present summer I operated on both eyes of a boy, between two and three years of age, for congenital cataracts: they were lenticular and gelatinous, the crystallines being of their natural size, and of a pure milky-white. In the eye first operated on, I divided the capsule and lens with the needle, and gently disturbed the latter, which remained in its situation behind the pupil. At the end of a fortnight I operated on the other eye. The lens revolved when I pressed the needle against it for the purpose of dividing it, and passed entire into the anterior chamber, which it nearly filled. Slight irritation occurred on the second or third day, requiring the application of three or four leeches; there was no subsequent redness or uneasiness, and the removal of the lens was complete by the end of the sixth week, leaving a clear black pupil, an iris with full power of motion, and perfect vision. The opaque body still filled the pupil in the opposite eye, apparently but little diminished. "I saw," says Professor WALTHER, "an entire, firm, dirty yellow lens pass into the anterior chamber, in a young man: it was completely absorbed in seven weeks. The presence of the foreign body at first excited considerable inflammation; and I thought it would be necessary to imitate the proceeding of DAVIEL, and extract it. But the parts gradually became accustomed to the irritation; the inflammation passed off, and I enjoyed with my pupils the interesting spectacle of an entire firm lens undergoing gradual removal by absorption, which was followed by complete recovery of sight."*

We must, however, proceed cautiously in passing fragments of opaque lens into the anterior chamber, because they act as foreign bodies, and often excite considerable and obstinate inflammation, during which the process of absorption is suspended. This is particularly the case when the fragment is of firm consistence: a small particle of hard lens will cause so much irritation as to render its removal by a section of the cornea necessary, while even a considerable piece of the soft or gelatinous kind may be introduced into the chamber with impunity.

The mischief produced by the passage of a hard lens into the anterior chamber is exemplified by a case related and figured by Dr. FARRE in the work † quoted below. "Fig. 6 is added to show the effect of making too large an aperture in the anterior lamella of the capsule. WHEATLEY, admitted into the infirmary in 1810, was dismissed with a free aperture in the capsule, and a lens partially dissolved, so as to leave a segment of the pupil clear, the eye was perfectly free from inflammation, and his vision was very useful; but as the solution went on, the large nucleus lost its support, and dropped into the anterior chamber, as it is represented. From that moment inflammation was excited, and has been kept up in different degrees for more than twelve months, by which the process of solution has not only been considerably retarded, in consequence of the effusion of coagulable lymph around this nucleus, but the cure has been rendered doubtful." In the figure, to which the preceding account refers, a lens not much below the natural size is seen in the anterior chamber of an inflamed eye.

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* *Merkwürdige Heilung eines Eiterauges, &c.* p. 59, 60.

† Plate 7, fig. 6, and page 231.

The opaque capsule does not undergo absorption behind the iris; perhaps because it retains more or less completely its natural connexions. Thus we see it remaining in the eye unaltered for years. From the case, related at p. 144, it should seem that the capsule is not liable to absorption even in the anterior chamber. In his account of Mr. SAUNDERS's operation for congenital cataract, Dr. FARRE states generally that the opaque capsule is never removed by absorption: "all that is capable of being absorbed, nature herself removes, and she only fails to accomplish her purpose, because the capsule cannot be destroyed by this process."* In the same work, the 1st and 2nd figures of the 6th plate "represent the eyes of CHAPPLE, a girl twelve years old, in whom the central aperture was effected in both eyes; and as the cataract was capsular, the aperture would have been enlarged, if the capsule had not been so tough as to render it impossible. This thickened capsule is incapable of being dissolved or absorbed. A margin of it behind the pupil, and some portions of it, which were detached into the anterior chamber, presented the same appearance at the end of three years which they did immediately after the operation."† I have seen this patient more than once, many years after the description just quoted was written: the fragments of capsule remained unaltered in the anterior chamber.

Keratonyxis.—The operation by solution or absoption, has been sometimes performed by introducing the needle through the cornea, and lacerating the capsule of the lens. This, which is called *keratonyxis*, was first practised by a German surgeon, named CONRADI.‡ It was introduced into practice in this

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* *A Treatise on some practical Points, &c.* by the late J. C. SAUNDERS, 2nd edit. p. 156.

† *Ibid*, p. 225.

‡ GLEIZE opened the capsule with a needle introduced through the pupil, when he had been foiled in an attempt at extraction; a sudden movement of the patient having withdrawn the eye from the knife after the cornea had been punctured. The cataract was completely dissolved by the twentieth day. He subsequently repeated this proceeding intentionally in other cases, and always with good result. The solution of the lens takes place in fifteen to fifty days; the softer the cataract, the shorter is the time required for solution. He observes that depression might be accomplished in this way.—*Nouvelles observations pratiques sur les maladies de l' œil et leur traitement.* Paris, 1796.

CONRADI, who was stadt-physicus (town-physician) in Northeim, proposed the introduction of the needle through the cornea as a regular mode of operating, in his *Vorschlag zu einer einfachen methode den staar zu stechen*, contained in his *Chirurgische Beobachtungen*, printed in ARNEMAN's *Magazin fur die Wundartzney-wissenschaft*, vol. i. stuck i. 1797. He was obliged to withdraw the knife after opening the cornea in an attempt at extraction; he punctured the country by Mr. **Saunders**. It is an essential circumstance in the performance of keratonyxis, that the pupil should be fully dilated by belladonna. Mr. **Saunders**, who employed this mode of proceeding in congenital cases, proposed to make an opening in the centre of the capsule, and having slightly acted on the lens, to leave it for absorption. He used his straight sharp-pointed needle, which should be carried through the cornea at one sixth or one-eighth of an inch from its margin; it should be so constructed as to fill the wound in the cornea, and thus prevent the escape of the aqueus humor. **Langenbeck** extended the use of this method, and resorted to it for the purposes of depression and of breaking up the lens for absorption. He used a curved needle, nearly like **Scarpa**'s, cutting on its edges, and filling the puncture as it entered. He introduced this needle from below. In a tract on the subject in which the mode of operating is minutely described and illustrated by figures, as well as by numerous cases, **Langenbeck** gives the most favourable account of the operation and its results.[*] It has not been viewed in the same light by others. **Beer** tried it extensively soon after its proposal by **Conradi**; but his cases turned out badly;[†] and the result of several trials by **Jaeger**[‡] was equally unfortunate. There is much less power of acting on the lens and capsule, whether for depression or division, when the needle is introduced through the cornea in the *anterior operation*, as keratonyxis is also called, than in the posterior, when it is entered behind the iris. Escape of the aqueus humor at the puncture of the cornea often occurs, being followed by protrusion of the iris and lens against the needle, and sometimes by dislocation of the latter. At least it prevents us from prosecuting the operation. That it frequently gives rise to severe inter-

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capsule with a needle, and in eight to twelve weeks the pupil was clear. He has stated fairly the advantages of the method, and observes that if the cataract does not dissolve, any other operation may be performed. He operated on a woman of seventy: at the end of twenty months there was no change. Probably it was a hard lens. **Buchhorn** gave to this method the name *Keratonyxis*, (from *κερας*, horn, and *νυξις*, puncture,) and made it the subject of his inaugural dissertation at Halle in 1806, under the title "*De Keratonyxide, nova caturactæ aliisque oculorum morbis medendi methodo chirurgica*. He afterwards published a more full account of the subject in the German language; *Die Keratonyxis, eine neue gefahrlosere methode den grauen Staar zu operiren*, Magdeburg, 1811.

[*] *Prüfung der Keratonyxis, einer neuen methode den Staar durch die Hornhaut zu operiren, ihn zu zerstückeln, &c.* Göttingen, 1811.

[†] *Einige praktische Bemerkungen, &c.* in **Arneman**'s *Magazin*, vol. i. stuck 3.

[‡] *Diss. inaug. de Keratonyxidis usu*, Vienna, 1812. It is reprinted in **Radius**, *Scriptores ophthalmologici minores*, vol. i.

nal inflammation is shown by the cases in the dissertation of Professor JAEGER. The same point is illustrated by the circumstance of an essay* having been written expressly to describe the phenomena and treatment of a chronic iritis frequently consequent on the operation. It appears clearly that the author had seen the affection repeatedly. I should therefore think it proper to abandon the anterior operation as a general mode of proceeding, and to confine it simply to the laceration of the capsule, and the consequent admission of the aqueus humor to the substance of the lens, and to complete the proceeding subsequently, by introducing the needle behind the iris.

SECTION V.—CONGENITAL CATARACT.

This is sometimes lenticular, but more frequently capsulo-lenticular. The lens is usually opaque throughout; generally of its natural consistence, which is gelatinous, sometimes softer or even fluid, but never hard. After losing its transparency, the crystalline frequently undergoes absorption: hence we often find it lessened, reduced to a small fragment, or as thin as a wafer; it may even be removed entirely. Central opacity of the lens seems to be known only as a form of congenital cataract. Here, one fourth, or a larger portion of the diameter presents a greyish opacity, and the circumference is completely transparent, so that, when the pupil is dilated, there is good or even perfect vision, although under other circumstances the patient is nearly blind. This partial central opacity sometimes presents exactly the appearance of a small opaque lens, surrounded by an opaque capsule: this appearance, however, is quite deceptive; the opacity in such cases affects only the nucleus of the crystalline, and it is surrounded by the rest of the organ in a transparent state. In this form of the affection the lens retains its natural magnitude; it does not become reduced by absorption.

The lenticular cataract of infants is generally attended with opacity of the capsule, which, as in the adult, is usually partial, in streaks, dots, or specks. Sometimes there is an opaque central portion, more or less considerable, and thick, so as to project above the general level. In proportion as the lens is absorbed, the anterior and posterior layers of the capsule approach each other, shrink, and become corrugated. At last a thick tough capsule alone remains (*cataracta arida siliquata.**)

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* *Commentatio ophthalmica de iridite chronica ex Keratonyxide suborta*, a H. B. SCHINDLER; *Vratislaviæ*, 1819. An abstract is given in LANGENBECK *neue chirurgische bibliothek*, vol. ii.'

I am not able to state whether the affection is strictly congenital, not having seen it either within a few hours or a few days of birth. In the cases which I have seen, the complaint has not been discovered till some weeks after birth.

It often appears in more than one child of the same family. It is stated by Dr. FARRE that sixty cases were submitted to the care of Mr. SAUNDERS. "Of these, two brothers, between whose ages there was a difference of six years, were both affected with congenital cataracts. In a second family, two brothers, twins, became blind with cataracts at the age of twenty-one months, each within a few days of the other. It is remarkable that the four cataracts had precisely the same character. In a third family, a brother and two sisters were born with this disease. The eldest sister was affected with it only in one eye, the brother and youngest sister in both eyes.

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* The kind of cataract was noted by Mr. SAUNDERS in forty-four cases; and the following enumeration exhibits the relative numbers of the different species:—

Solid opaque lens, with or without opacity of the capsule. Three single, two double cataracts	5
Solid lens, opaque in the centre, transparent in the circumference, with capsule in the same state. Five double	5
Soft opaque lens, with or without opacity of the capsule. Two single, two double	4
Soft opaque lens, with solid nucleus. One single, two double	3
Soft opaque lens with dotted capsule; the spots white, the spaces transparent. Two double	2
Fluid cataract, with opacity of the capsule. Two single	2
Fluid cataract, with opacity of the capsule, and closed pupil. Two double	2
Opaque and thickened capsule, the lens being completely absorbed, or the remains of it being thin and squamose. Six single, twelve double	18
Opaque and thickened capsule, with only a very small nucleus of the lens in the centre. Two single	2
Opaque and thickened capsule in the centre, remains of the lens in the circumference. One double	1

—*Lib. cit.* p. 159.

The expression "*solid* lens," in the foregoing enumeration, must be understood to denote that the crystalline possessed its natural consistence; for it does not become firmer in congenital cases.

In a fourth family, three brothers and a sister had all congenital cataracts.[*]

During the present year I had under my care, at St. Bartholomew's, two brothers, between two and four years old, with cataracts. They were lenticular in one, the crystallines being of their natural size; in the other, the lens was diminished on each side to a thin scale, the capsule presenting in each eye a thick dense central opacity, and a few small spots scattered around it.

Congenital cases differ much in the degree of vision enjoyed by the patient. In central lenticular or capsular cataract there may be good sight, especially when the pupil is dilated. In some cases, objects and colours can be distinguished; while in others the patient can merely distinguish light from darkness.

Operation on infants.[†]—While extraction is not only altogether unsuitable to the various forms of congenital cataract, but absolutely impracticable without the greatest risk or rather certain destruction of the organ, the cure can be accomplished with facility and safety by means of the needle. The smallness of the palpebral fissure, the unsteady movements of the eye, and the resistance of the child to all attempts at opening the lids, produce some difficulty in fixing the head and denuding the surface of the organ sufficiently for the purposes of the operation: this indeed is the only real difficulty in the process. The pupil should be fully dilated by the previous application of belladonna.

A narrow table is the most convenient for the operation. The child must be laid on its back, with the head on a small pillow, which should be so placed that the head may fall rather over it, in order that we may have a good light on the eye. One assistant must hold the legs and lower part of the trunk; another, the arms and chest; while a third, placed behind, fixes the head between his two hands, applied one on each side. A fourth assistant, who depresses the lower lid with the forefinger of one hand, may also, if necessary, use the other under the chin, to prevent any forward movement

[*] *Lib. cit.* p. 158.

[†] *On the use of the couching-needle in infants of a few months old*, by B. GIBSON: in the *Edinburgh Medical and Surgical Journal*, vol. vii. 1811, p. 394.

On the operation of largely puncturing the capsule of the crystalline humour, in order to promote the absorption of the cataract, by Mr. WARE, in his *Observations on the Cataract, &c.* 3rd edit. 1812, p. 363.

On the congenital cataract, by Mr. SAUNDERS, in his posthumous work edited by Dr. FARRE, chap. vi.

of the head. The operator, who is placed behind the head, raises the upper lid by the elevator of PELLIER, with which he holds it securely against the margin of the orbit: it cannot be so properly elevated and securely fixed by the fingers. With the other hand, he pierces the tunics with the needle in the same situation as in the operation of depression. A small, straight sharp-pointed, needle, cutting on its edges for about a quarter or three-eighths of an inch, should be employed. The purposes of the operation may, however, be accomplished with SCARPA's needle, which was used by the late Mr. GIBSON.*

In operating on the right eye, the elevator is held in the left hand, and the needle in the right; when we proceed to the left eye, the employments of the hands are reversed. If the surgeon should prefer it, he may place himself in front of the patient to operate on the left eye; he will then depress the lower eye-lid with his left hand, and hold the needle in the right, while an assistant, placed behind the patient, elevates the upper eye-lid. I consider the first-mentioned method to be preferable, because the operator, holding the speculum, can exert with it a little pressure, so as to steady the eye, if it should be necessary. If the speculum is entrusted to an assistant, he must not venture to press on the globe.

After the coats have been punctured, the instrument must be passed through the thin edge of the cataract into the anterior chamber, and carried on till its point reaches the opposite edge of the pupil. The lens and capsule may now be divided transversely by a backward movement of the instrument, with which we may still further break up the lens, and push the fragments into the anterior chamber, where, on account of their softness, they excite little or no irritation, and are speedily absorbed.

When the lens has been removed by absorption, an opaque capsule usually remains, occupying more or less of the pupil, proportionally impeding vision, and requiring another operation. If the capsule is transparent, sight may be restored by one operation. In the case of this secondary membranous cataract, or where we have to operate in the first instance on an opaque capsule, we must proceed in the infant as we should do in the adult. We introduce the needle with cutting edges behind the iris, detach the opaque membrane at its circumference on the upper part and sides, for about three-fourths or four-fifths of its whole extent, separating it as completely as we can from the ciliary body, and depressing it. When thus detached and depressed, it often rises up after the needle is removed, and seems to fill the pupil as before: but it shrinks when no longer connected at the circumference, and is gradually withdrawn behind the lower edge of the pupil.

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* *Edinb. Med. and Surg. Journal*, vol. vii. p. 398.

Another mode of proceeding is to make a straight transverse incision through the opaque capsule with the cutting needle, leaving its connexions at the circumference undisturbed. Indeed, care must be taken not to detach it from the ciliary body. The edges of the incision retract and separate, so as to leave ultimately a sufficient pupillary aperture. It must be observed that the opaque capsule, which is often of considerable thickness, particularly in its collapsed and shrivelled state after the spontaneous absorption of the lens, (*cataracta arida siliquata*,) is often very tough and strong, so as to resist the instrument, and to require considerable force before its division or detachment can be accomplished.

The anterior operation, or keratonyxis, may be performed on the infant; and was generally preferred by Mr. SAUNDERS. Pressure on the globe must be carefully avoided in adopting this method, as it would favour the escape of the aqueus humor; an occurrence which either renders further proceedings difficult, or prevents them altogether. The power of acting on the lens and capsule, for the purposes just described, is so much less in this method than in the posterior operation, that I consider it particularly unsuited to congenital cases, and have consequently long abandoned it in them.

The operation of keratonyxis was well enough suited to the particular object which Mr. SAUNDERS attempted to accomplish in congenital cataracts; viz. the formation of an opening in the opaque capsule. His mode of proceeding is thus described by Dr. FARRE. "The surgeon gently introduces the bow of the speculum under the upper eye-lid, his assistant at the same time depressing the lower, and at the moment he is about to pierce the cornea, he fixes the eye by resting the speculum with a moderate pressure on the eye-ball. The position of the operator enables him to do this with perfect safety; and by that consent which can only exist between the hands of the same person, he not only discontinues the pressure, by using the speculum merely as an elevator of the lid, as soon as his purpose is accomplished, but he with facility renews or regulates the pressure at any moment in which it may be required. He penetrates the cornea as near to its junction with the sclerotica as will admit the flat surface of the needle to pass, in a direction parallel and close to the iris, without injuring this membrane. When the point of the needle has arrived at the centre of the dilated pupil, he does not boldly plunge it through the capsule into the lens, and perform any depressing motion: it is a material object with him not to injure the vitreus humor or its capsule; neither does he lift the capsule of the lens on the point of the needle, and by forcibly drawing it forward into the anterior chamber rend it through its whole extent. Such an operation would dislocate the lens, deliver it into the anterior chamber, or leave it projecting in the pupil, and stretching the iris; and, although its soft texture in the child should exempt him from any disorganizing inflammation, the most favourable result will be a permanently dilated iris, deforming the eye. He proceeds with a gentle lateral motion, working with the point and shoulders of the needle only on the surface and centre of the capsule, in a circumference which does not exceed the natural size of the pupil. His object is *permanently* to destroy this central portion of the capsule: merely to pierce it would not answer his intention, because the adhesive process will speedily close the wound. Having acted on the centre of the anterior lamella of the capsule to the extent which he wishes, he gently sinks the needle into the body of the lens, and moderately opens its texture."[*] "A single operation sometimes suffices, and the cure is completed in the space of a few weeks; but if the process does not advance with sufficient rapidity, the operation may be repeated once or oftener, interposing at least a fortnight between each operation. If the adhesive process has counteracted his former operation on the capsule, he may take care now to effect the permanent aperture in the centre, and he may use greater liberty than at first in opening the texture of the lens."[†]

Mr. SAUNDERS acted in the same manner on the lens and capsule, when he introduced the needle behind the iris. "As soon as the needle has penetrated the tunics, he gently depresses its handle, so as to direct its point towards the capsule through the thin edge of the lens; and steadily projecting its flat surface between the capsule and lens, he arrives at the centre of the capsule which he opens, taking the same precaution as in the anterior operation, not to rend it extensively, lest he should dislocate the lens. He now cautiously opens the texture of the lens, and withdraws the needle. In his subsequent operations he will complete the central aperture in the capsule, and then loosen the texture of the lens, suffering the flocculi to fall into the anterior chamber, but not projecting into it any considerable portions of the lens, for the process of its solution and absorption is best accomplished in its natural position."[*] If the operation on the infant be performed with the requisite gentleness, it is rarely followed by inflammation.[†] Hence both eyes may be operated on at once. The patients, however, must be closely watched; their bowels must be kept open, and leeches must be immediately applied if redness and pain should supervene. A cloth dipped in cold water may be kept on the eyes, if it can be easily done: but if its application annoys the child, and the eye is not inflamed, it need not be persisted in.

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[*] *A Treatise on some practical Points relating to the Diseases of the Eye*, by the late J. C. SAUNDERS, p. 163—165.

[†] *Ibid*, p. 166.

Permanent dilatation of the pupil should be kept up after the operation by applying the moistened extract of belladonna on the brow.

Two or more operations are sometimes necessary to accomplish the point of clearing the pupil. Dr. Farre recommends that a fortnight at least should intervene between each operation.[‡] Mr. Ware tries to promote absorption "by dropping on the eye once or twice in the day a small portion of powdered sugar!" If this should not succeed, he operates again at the end of a week or ten days; and repeats the operation, if necessary, after a similar interval.[§] I consider both these periods to be much too short. If the lens be left in its situation behind the iris, its absorption will occupy many weeks.

What is the proper age for the operation?

It was formerly the practice to defer the operation, in cases of congenital cataract, till patients had grown up; at least, until they had attained an age at which they might be supposed to understand the necessity and importance of the operation, and to be able to exercise self-constraint in submitting to the proceeding. Unfortunately, however, when a person is born blind, the eyes oscillate irregularly from side to side.

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[*] *Ibid*, p. 170.

[†] If the patient suffer much pain, either during the operation or after it, it may be advisable to take blood from a vein in the arm, or by leeches from the temple; but in my own practice I have not found this once necessary in infants, and, very rarely, in persons under twenty years of age."—Mr. Ware, in the book before quoted, p 374.

[‡] *Lib. cit.* p. 166.

[§] *Lib. cit.* p. 375.

They seem to be equally acted on by the various muscles, which, from the want of external perception, do not acquire the power of directing them, or fixing them on objects sufficiently for distinct vision. If the blindness continues long after birth, this unsteady rolling motion becomes confirmed and inveterate, so that, even if we succeed in giving sight by the operation, the patient has not the power of controlling the muscles of the eye by the exercise of volition. Years may elapse without any progress in gaining such a power; and probably persons thus circumstanced never become able to fix the eyes sufficiently for good vision. I operated at the London Ophthalmic Infirmary, for congenital cataracts, on a girl fourteen years old. The operation was completely successful, and both pupils were as clear as if she had been born with perfect eyes. At the end of some months the rolling motion still continued, so that vision was not of much use. In a case mentioned by Dr. **Farre**, he says, "the disadvantage of a protracted operation was very manifest. It was performed on both eyes at the age of ten years, but such a tremulous motion of them had been acquired, that she cannot even now, although three years have elapsed since she was cured, direct her eyes to objects with sufficient precision."* While this sheet is passing through the press, I have seen a youth of fifteen, in whom the eyes were operated on seven or eight years ago; they still oscillate irregularly from side to side as before the operation.

Dr. **Farre** also thinks that the power of the retina becomes impaired by want of exercise. "The retina too, by a law common to all the structures of an animal body, for want of being exercised, fades in power. Its sensibility, in many of the cases cured at the ages of four years and under, could not be surpassed in children who had enjoyed vision from birth; but at eight years, or even earlier, the sense was evidently less active; at twelve, it was still more dull; and from the age of fifteen and upwards, it was generally very imperfect, and sometimes the mere perception of light remained."†

Mr. **Saunders** operated on five cases, at different ages from two to nine months; and on nine, from thirteen months to two years. His other patients, amounting altogether to sixty, were of various ages from that last mentioned to twenty-eight. "The greatest success attended the operation between the ages of eighteen months and four years; and if any intermediate time be selected, the Editor is inclined to recommend the age of two years. The parts have then attained a degree of resistance which enables the surgeon to operate with greater precision than at an earlier period, yet the capsule has not become so tough and flexible as it does at a later period, after the lens has been more completely absorbed."*

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* *Lib. cit.* p. 225.

† *Ibid.* p. 176.

I have operated with perfect success on infants of six weeks: in general, two months would be early enough. Thinking it of consequence that the education of the eye should begin early, and wishing to avoid all risk of the involuntary undulating movement of the globe becoming confirmed, I have always operated in the first year, when I have had the choice.

Secondary cataract.—When an opaque body is seen in the pupil after an operation for cataract has been performed, the case has been called secondary cataract. In the proceeding by absorption or solution, the lens is generally left in its situation, and consequently is seen behind the iris after the operation: this is not called secondary cataract, that name being given to opacities in or behind the pupil subsequent to extraction, depression or reclination. A fragment of lens, or more frequently some of its exterior soft substance, may remain in or behind the pupil after either of the operations last-mentioned: they will be removed sooner or later by absorption. After the lens has been removed from the axis of vision, an opaque capsule may remain behind; or the capsule may become opaque after the operation. Such secondary membranous cataracts must be treated in the manner already described; (see p. 446.) In the case of a floating piece of capsule, which can neither be depressed, nor disposed of in any other way, if it should impede vision, we must make an opening in the cornea, and extract it by means of a small forceps or hook. Another kind of secondary membranous cataract results from inflammation of the iris, when it produces effusion of lymph, and its subsequent organization into an adventitious membrane. This may be remedied by the method already mentioned of operating for capsular cataract, or by the operation for artificial pupil, which will be considered in the next chapter.

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* *Lib. cit* p. 175.

CHAPTER XXIV.

FORMATION OF AN ARTIFICIAL PUPIL.

When vision has been destroyed or impaired by contraction, closure, or displacement of the pupil, or by such changes combined with obstruction of the opening by an adventitious membrane, or an opaque capsule, or with synechia anterior, or with opacity of the cornea, relief may be given by enlarging the natural pupil, by making a new aperture for the passage of light through the iris, or by a combination of both these proceedings. The various methods employed for these purposes are called THE OPERATIONS FOR ARTIFICIAL PUPIL, (*conformatio pupillæ artificialis ; coremorphosis*, from χορη, pupil, and μορφωσις, formation.)

Although the first attempts of this kind were made in the earlier part of the last century, the operation was not much practised till towards its very close; since which period so much attention has been paid to it, so many persons have investigated and attempted to improve it, that the methods of proceeding, and the instrumental apparatus, are perhaps more diversified than in any other surgical operation. The latter circumstances are partly accounted for by the differences in the states of the eye requiring operative assistance, partly by that desire of producing something new, which often leads us to neglect what is simple and sufficient, for more complicated, but less advantageous proceedings.

The changes in the state of the eye, requiring the formation of an artificial aperture, through which light may gain admission into the interior of the organ, are numerous and various, and cannot all be comprehended under the common expression *closure of the pupil ;* although such closure, or rather obstruction of the aperture, direct or indirect, must exist whenever the operation is required. Some of these changes are seated in the cornea, others in the cornea and iris; several in the iris alone; some in the capsule and lens as well as in the iris; while others involve at one and the same time, the cornea, iris, capsule, and lens. Although we speak of the operation for artificial pupil in the singular number, a mere glance at the subject will suffice to show that no one operation can be suited to the various morbid conditions of these several organs, which interfere, more or less seriously, with the passage of light into the posterior part of the globe. It is not our object to compare the various proceedings with the view of finding which is generally preferable; the attempt at devising any one method that would be applicable in all cases, would be manifestly absurd. We must carefully examine the several states of the organ, in order to determine which mode of proceeding may be preferable in each instance.

STATES OF THE EYE, REQUIRING THE OPERATION.

The following are the conditions of the organ to which the operation for artificial pupil is applicable.

1. Simple closure of the pupil, consequent on acute iritis, without opacity of the lens or capsule. This is a rare occurrence; and it must be difficult to ascertain that the lens and capsule have undergone no change.

2. Closure of the pupil by an adventitious membrane, (*occlusio pupillæ lymphatica.*) Such a state may be the result of the different operations for cataract; that is, of extraction, depression, reclination, or the operation by absorption; or it may remain after iritis, when it occurs from internal causes, as in the idiopathic, arthritic, or syphilitic kinds.

3. Closure of the pupil, with adhesion of its margin to an opaque capsule, the lens being at the same time generally, if not always, opaque, (*occlusio pupillæ cum synechia posteriori.*) This is a consequence of iritis.

In the cases now enumerated, the cornea and anterior chamber are usually natural, and the fibres of the iris are more or less on the stretch.

4. Contraction or closure of the pupil, with synechia anterior, from prolapsus iridis, either through wound or ulcer of the cornea. A prolapsus near the centre of the cornea may include the whole pupil, and thus completely destroy sight. In such a case the cornea is leucomatous in its centre, transparent in the circumference; the fibres of the iris are stretched from the ciliary margin to the edge of the leucoma, and either in contact with the transparent portion of the cornea or separated from it by the smallest interval. The entire pupil

may be involved in a prolapsus more or less near to the circumference of the cornea, or at its very edge; the fibres of the iris are tightly stretched between the opacity and the most distant part of the corneal margin, and a larger anterior chamber is left in the same situation. If the prolapsus should have included a part only of the pupillary margin, or a portion of the iris near the pupil, the aperture may be merely displaced, or contracted and altered in figure, yet the passage of light through it may be more or less effectually impeded by the opaque cicatrix, which remains after the wound or ulcer has healed. If a large portion should have been protruded, the fibres of the iris must be tightly stretched from the ciliary margin to the situation of their adhesion to the cornea; they are more or less tense in all cases of contracted or closed pupil from prolapsus iridis.

5. Contraction or closure of the pupil from partial staphyloma.

6. Obstruction of the pupil by central leucoma, the iris and other parts being natural. The effect on vision of central corneal opacity will vary according to its extent. If it is small, for instance, not exceeding one-third of the diameter of the cornea, the patient may enjoy good vision when the pupil is dilated either in a moderate light, or by the use of belladonna; and an operation would not then be advisable. If the leucoma should extend to two-thirds of the diameter, there will be no useful vision, and an operation will be required.

7. Obstruction of the pupil by synechia anterior and partial leucoma. The anterior adhesion may embrace the whole pupillary margin, with complete obstruction by the accompanying leucoma, and blindness. The adhesion may be partial, and the obstruction of the contracted and misshapen pupil may be partial also. The effect on vision will depend materially on the situation of the adhesion, and of the leucoma; if they are above the natural situation of the pupil, or on either side of it, they may not interfere much with vision; if below, the effect will be more injurious. In partial synechia anterior, the pupil may sometimes be so much enlarged by the use of belladonna, as to give good sight.

8. Central leucoma, with closed pupil, or synechia posterior, and opaque capsule.

9. Partial opacity of the cornea, with synechia anterior and cataract.

I have never seen the congenital closure of the pupil from continuance of the membrana pupillaris, (*imperforatio pupillæ*,)[*] which is mentioned by some writers.

Diagnosis.—Before we undertake to form an artificial pupil, we must satisfy ourselves that the morbid state of the organ cannot be remedied by any other means. Opacities of the cornea may often be diminished by external applications. The adventitious membrane closing the pupil may be lessened by absorption in recent cases. The use of belladonna may improve sight, or even render it perfect in partial synechia, anterior or posterior.

The operation merely provides for the admission of light into the eye: it will not restore sight unless the organ be in other respects healthy. A careful inquiry is therefore necessary to ascertain that no other change has taken place in the eye capable of frustrating the success of the operation. The various conditions of the organ, enumerated above as requiring the formation of an artificial pupil, are mostly the consequences of severe inflammation, either external or internal. This inflammation may not have been confined to the cornea, iris, and capsule of the crystalline; it will be found, in many instances, to have extended to the nervous structure of the eye, or to other parts of the organ. We must ascertain whether the loss of vision is produced by the changes in the pupil only, before we think of forming a new opening for the passage of light.

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[*] "I believe," says BEER, "that I have hitherto seen only once a truly congenital closure of the pupil, that is, an iris remaining completely imperforate after birth. In the sixth week the pupil had become open without any interference of art. I have, however, seen in newly-born infants, when a few days old, closed pupil; but careful inquiry has shown, in all such instances, that it was the consequence of iritis, produced in a few hours after birth, by exposure to strong lights, and neglected."—*Lehre*, v. ii. p. 190, note.

JUENGKEN enumerates it among the conditions of the eye requiring operation, adding that it is of very rare occurrence.—*Die Lehre von den Augenoperationen*, p. 628.

So far as my researches have gone, there is no evidence of the membrana pupillaris having ever been found perfect even a few days after birth; and I believe that no record exists of any case in which an operation has been performed on it. Dr. JACOB gives the following account of its disappearance:—"The period now approaches when it is to disappear; this occurrence takes place, according to my observations, a short time previous or subsequent to birth. In every instance where I have made the examination, I have found the membrana pupillaris existing in a greater or less degree of perfection in the new-born infant; frequently perfect without the smallest breach, sometimes presenting ragged apertures in several places; and, in other instances, nothing existing but a remnant hanging across the pupil like a cobweb. I have even succeeded in injecting a single vessel in the membrana pupillaris of the ninth month. Where I have examined it in subjects who have lived for a week or fortnight after birth, as proved by the umbilicus being healed, I have uniformly found a few shreds still remaining."—*Medico-chirurgical transactions*, vol. xii. p. 515, 516.

Our first step then must be a careful examination of the organ, in which attention must be directed to the condition of its various component parts. The colour and texture of the iris must be observed; these are changed by inflammation, and the alteration may be detected by comparing the affected with the sound eye. A blue or grey iris may exhibit a greenish or yellowish discolouration; a brown one may become of a dull bluish or leaden colour; the unnatural tint may be general, or in variously sized and shaped spots or patches. The fibrous texture may have disappeared, and whitish threads may be seen in various parts of the iris, with the spotted discolouration just mentioned. The natural brilliancy of the organ is gone. Under such changes the texture of the iris loses its natural softness and contractility; it becomes tough, thick, and incapable of motion. In other instances it is unnaturally thin and semi-transparent. If the inner circle only be changed in colour, it is not of much consequence; but if the alteration extend through the whole iris, it is unfavourable. If change of texture should be equally extensive, and occupy the whole of the greater or ciliary circle, it is probable that the inflammation extended beyond the iris, and that the ciliary body and other posterior parts of the globe have suffered. We must observe whether the iris preserves its natural position and uniform surface, or whether it bulges forwards, and is elevated into tubercular projections, separated by intervening constrictions. If it form a convexity in the anterior chamber, pushing against the cornea at its outer circle, and drawn in at the pupil, which adheres in its whole margin; and if its surface be puckered and irregular, it will have been so changed in texture, as to render the operation impracticable; while the retina will have undergone such alteration as to render the opening, even if one could be made, totally useless. Simple bulging of the iris, without change of colour or texture, does not absolutely contra-indicate the operation; though, as it implies a diseased state of parts behind, it is an unfavourable circumstance. The pupil is closed when the iris is thus pushed forwards, and the bulging may depend on accumulation of aqueous fluid behind. The effect of opening the pupil with the needle, and thus re-establishing the communication between the two chambers may be tried in such a case, if the state of the retina should hold out any encouragement to an operation.

The globe should have its natural size and consistence, being neither enlarged by dropsy, nor shrunk and flaccid from atrophy. No benefit can be expected from the operation if there should be either hydrophthalmia, or a soft and diminished globe.

Softness of the eye-ball, without diminution of bulk, especially if accompanied by a tremulous state of the iris, denotes synchisis, or disorganized vitreus humor, with which insensibility of the retina is usually, but not necessarily, connected. If the state of vision should be favourable, the operation may be undertaken in such a case, although the flaccidity of the organ may occasion additional difficulty in the execution, and the chance of benefit is small.[*]

Absorption of the sclerotica in the neighbourhood of the corpus ciliare, giving the globe a bluish or leaden colour at that part, staphylomatous protrusions of the sclerotica, and a varicous state of the external vessels, indicate serious disorganization of the internal parts of the globe, with insensibility of the retina.

We must examine further whether the retina possesses a clearly marked sensibility to light; for without that no benefit can be expected from the operation. It might be supposed that closure of the pupil, with opacity of the capsule, would prevent the passage of light to the retina, and thus deprive us of direct evidence respecting its sensibility. However, light is transmitted in sufficient quantity for this purpose. If the pupil be closed, and the lens and capsule opaque, the patient can still distinguish light from darkness, if the retina is unaffected. If the patient, therefore, cannot make that distinction, we may conclude that the eye is amaurotic, and the operation consequently hopeless. In many of the conditions requiring the operation for artificial pupil, a much greater degree of vision exists.

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[*] Sir William Adams speaks more favourably of these cases. "When the vitreus humor is transparent, its partial or total disorganization does not appear materially to affect vision. For after the cataract has been removed, or the artificial pupil formed, vision appears to be equally good, as if no such morbid change had taken place."—*Treatise on artificial pupil, &c.* p. 117.

"In several cases, where from the fluidity of the vitreus humor, it has escaped so abundantly during the operation, through the puncture made by the needle, as to occasion almost an entire collapse of the coats of the eye; yet, after its regeneration, the patient's vision has been restored as perfectly as is usual after the operation for cataract."—*Ibid.* p. 117, 118.

"Even when so much of the vitreus humor is absorbed, as to occasion a flaccid and diminished condition of the eye, I have in several instances operated with perfect success, both in the removal of cataract, and in the formation of an artificial pupil. Indeed, the success which has attended the operations for artificial pupil in these morbid states of the eye has frequently excited my surprise. For in several cases which have scarcely offered a sufficiently favourable prospect to justify the performance of an operation, but which, at the urgent importunity of the patient, I have executed, almost contrary to my judgment, the happiest results have nevertheless been obtained. In the case of a young lady who had been for many years a patient of the late Mr. Ware, I actually refused, from the soft state of her eye, to operate upon it. But encouraged by my success upon cases of a similar kind, I again sent for her to town to undergo the operation for artificial pupil, which in one eye terminated in the most favourable manner, the patient being enabled to see the minutest objects. An artificial pupil was formed with equal success in the other eye, but the retina had lost its sensibility."—*Ibid.* p. 119, 120.

These various points must be inquired into, that we may inform the patient whether an operation is likely to be successful or otherwise. It is our duty to represent to him accurately the state of the case. We can recommend the operation only where we think that it will be of advantage. Some states of the eye, however, are unfavourable without being hopeless. Under such circumstances, the patient may be inclined to try the experiment of a doubtful operation, rather than submit, without an effort, to permanent blindness.

The presence of external or internal inflammation, in any degree, absolutely contra-indicates the operation, so long as it continues. When the organ is thus excited, the additional irritation of mechanical violence would aggravate the inflammatory disorder, and thus probably increase the evils which the operation was designed to remedy.

A good state of health is necessary to the success of the operation, which must not be thought of so long as any constitutional disease, such as gout or rheumatism, is in activity.

"The formation of an artificial pupil," says BEER, "without reference to the particular mode of proceeding, is indicated in those cases only, in which the blindness is caused merely by the closure or the obstruction of the normal pupil; when the sensibility to light is unequivocal; when no other deviations exist from the natural form and structure of the globe, which might render the operation extremely difficult or impracticable; when the previous inflammation has been long and completely terminated; when the patient is, in other respects, healthy, and does not show even any marks of previous scrofulous, syphilitic, or arthritic disease; and when, moreover, he is completely blind in both eyes."* From the previous statement respecting sensibility to light, it is obvious that the last observation is not to be taken strictly, but that it must be understood as importing the absence of useful vision.

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* *Lehre*, vol. ii. p. 196.

Prognosis.—A serious wound is inflicted in this operation on the most sensible texture of the eye; considerable inflammatory re-action may be expected, and the results cannot be estimated with much certainty beforehand. Generally speaking, the necessity for the operation arises out of disorders originally inflammatory; and the eyes, on which it is performed, having suffered much from wounds or violent inflammations, are rendered more susceptible of injury, and more likely to suffer from future attacks. Hence it is difficult to determine the probable consequences of an operation. "We cannot," says JUENGKEN, "satisfy ourselves respecting the state of the posterior structures, particularly in the cases in which the natural pupil is completely closed. Instances occur in which we conclude with great probability that the vitreus humor and retina are healthy; yet it turns out afterwards that they are not so. I have observed cases of the kind, in which, although there was a distinct perception of light, the posterior parts of the globe were altered in texture, as the result of the operation proved.*

The operation is often performed on eyes, in which the lens has been already lost; while we are frequently obliged to make the new pupil in a situation disadvantageous for vision. These are two sources of imperfection in the subsequent state of the sense.

The new opening is not susceptible of those changes in its dimensions, which occur in the normal pupil. On this point, Mr. GIBSON says, "I have paid considerable attention to the state of the artificial pupil, after the eye has quite recovered, in order to ascertain whether the fibres of the iris possess any power of motion, so as to alter the size of the new opening; but have never been able to detect any thing similar to the contraction and dilatation of the natural pupil."†

Again, there are often niceties and difficulties in the execution of the operation, which are increased by the involuntary motions and unsteadiness of the patient. Hence we must be very guarded in our promises as to the result of the proceeding. In some rare instances, in which the eye has not suffered much, in which the lens and capsule are entire, and not injured by the operation, perfect sight may be restored. But, generally speaking, the result of this proceeding is much less favourable than that of cataract operations. In many instances, the patient must be contented if he should be able to see large objects, and to find his way alone.

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* *Lehre, von den Augenoperationen*, p. 361.

† *Practical Observations on the formation of an artificial pupil*, p. 49, 50.

Mr. Gibson observes, that "the degree of vision restored by an operation of this kind, is not quite so perfect as that which succeeds the removal of a cataract. In most cases, however, when the cornea has been perfectly transparent to the full extent of one-third of its diameter, the patient has been able to read tolerably small print. In looking at any thing, the direction of the eye and position of the head are somewhat altered, and the object viewed is not held directly before the eye. Thus the artificial pupil, when formed towards the external angle of the eye, is turned by the motion of that organ more towards the internal angle, so as to bring that side of the eye somewhat forwards, and to produce a squint. And when an object, as a watch, is taken into the hand to be viewed, it is not held, as in the natural state of the eye, directly before the observer, but a little to one side. This alteration in the direction of the eye, and in the situation of the object viewed, is evidently the result of experience; for a person, having an artificial pupil situated towards the external angle of the eye, can discern an object placed directly before him; but he sees it indistinctly, as another person, whose eyes are perfect, discerns objects inaccurately which are placed aside whilst the eye is directed to objects before him. The reason of this appears to be, that the rays of light passing from oblique objects, or entering the eye with great obliquity, do not reach the retina in sufficient quantity to render vision distinct. This indistinctness the patient attempts to remove, by placing the object in different situations, and by varying, at the same time, the position of the eye and head, until he at length discovers the exact position of the eye and object most conducive to distinct vision.[*]

The prognosis is more favourable in proportion as the imperfection or loss of vision is simply dependent on obstruction of the pupil, and as the iris itself, the cornea, and other parts of the organ, are sound. The best cases, therefore, are those of central leucoma with healthy iris and unadherent pupil, of partial synechia anterior, and of pupils contracted or closed from prolapsus of the iris through wound or ulcer of the cornea. In those, which are usually the results of common inflammation affecting the external tunics, if we except the changes requiring the operation, the globe is perfectly healthy. Closure of the pupil after operations for cataract is also a favourable case, especially after extraction: in the serious internal inflammation, which sometimes follows depression and reclination, the posterior tunics generally are often involved. Iritis and other internal inflammations do not come on in healthy constitutions. Hence, when the pupil has been closed under such circumstances, the operation itself may cause a return of the original disease with renewed effusion of lymph. The prognosis is bad when the iris is changed in colour and texture throughout, and still worse if it is also convex on its anterior surface, tuberculated and puckered.

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[*] *Lib. cit.* p. 47—49.

The prospect of benefit from the operation is influenced by the extent of the organic changes in the cornea and iris, which render it necessary. It is better in proportion as more of the cornea remains transparent, and more of the iris and pupil unadherent. If the clear portion of the former, and the free part of the iris, are less than one-third of the whole, the result will be doubtful.

The situation and size of the new opening must be taken into consideration. The nearer it is to the centre of the iris, the better will the patient see: the more it approaches to the circumference, the more imperfect will vision be, both because the rays of light fall on a part of the retina naturally less sensible, and because the patient must learn to squint more or less, in order to bring the eye into the best direction for vision.

A further reason against making an artificial pupil at the greater circumference of the iris, is derived from the position of the ciliary processes, the anterior extremities of which are placed behind this part of the iris, and would therefore partially obstruct the new opening. This point has been particularly insisted upon by SCARPA. "Another rule," says he, "no less important to be followed in these cases, is, that the *lateral* pupil, although necessarily instituted in the semidiameter of the iris, be always at a sufficient distance from the corpus ciliare, that this part may not render the operation useless by intercepting the passage of light through the new pupil. All, who are acquainted with the structure of the eye, know that the corpus ciliare, with its processes, is prolonged from the ciliary ligament to the circumference of the capsule of the crystalline lens behind the great margin of the iris, extending to about a fourth of the length of the semidiameter of the membrane, from this ciliary ligament towards the centre of the iris. Every artificial pupil, therefore, which is not made at such a distance from the great margin of the iris, and consequently from the corpus ciliare, that the apex at least of the triangular aperture may correspond directly to the circumference, which would have been occupied by the capsule of the crystalline, must be useless."*

In general, sight will be better, the larger we can make the new pupil. The artificial opening has in most cases a disposition to contract or close: it is formed in a part where there is no natural aperture, and as attempts are generally made to repair the consequences of injury, we may expect that the new opening in the iris will become smaller after the operation. The iritis consequent on the injury increases the contraction, which sometimes proceeds to entire closure. "The permanency of the artificial pupil," says Mr. GIBSON, "appears to me to depend principally upon the size of the opening, and healthy state of the iris and contiguous parts of the eye, at the time of the operation. When the artificial pupil has been made almost as large as the medium size of the natural one, and especially, when the part of the iris removed has included its border, I have never seen any disposition in the opening to close. When, however, a mere narrow slip has been removed; when the iris, from previous inflammation, has become more vascular than natural, or when it is complicated with adhesions to the capsule of the crystalline lens, in such cases its closure has occasionally taken place."†

The prognosis is most favourable when the purposes of the operation are accomplished by a simple clean cut of the iris; forcible detachment of it from the ciliary body, with laceration, protrusion, and strangulation of the part, is a more serious kind of injury, from which inflammation is more likely to result.

Previous considerations.—When one eye is sound, it is not advisable to operate on the other. Vision, with an artificial pupil, is very imperfect, compared to natural sight; hence the patient continues to use his sound eye, so that he is no better off after the operation than he was before, even if it should succeed. The apprehension has been expressed, that the imperfect sight on the operated side might confuse that of the good eye.‡

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* *Treatise, &c.*, p. 312, 383.

† *Practical Observations on the formation of an artificial pupil*, p. 47.

‡ "To form an artificial pupil in one eye, when the other is perfect, is quite

When the sight of one eye has been irrecoverably lost, our decision respecting the propriety of performing the operation for artificial pupil on the other, must be regulated by the degree of its vision. If the patient can see large objects, and find his way without a guide, it would be hazardous to operate, because blindness sometimes results from the operation, particularly where the eye has already been seriously and repeatedly diseased. If there is no useful sight, the experiment may be tried, as the patient cannot be rendered worse.

"When both eyes," says Mr. GIBSON, "have happened to be similarly affected with opacity of the cornea, I have found it of little use to the patient, to form an artificial pupil in each. For when the vision of one eye, after the operation, is more perfect than that of the other, the patient (as in many cases of defective vision) acquires the habit of using the more perfect eye, and entirely neglects the other. When, therefore, I meet with a defect in both eyes from opacity, I select the more perfect for the subject of an operation."*

The situation of the new pupil requires some attention. This is often determined by the nature of the case; as the artificial opening must be made opposite to such part of the cornea as retains its transparency. Certain positions, however, being more advantageous than others, are to be preferred, when we have a choice. The middle of the iris is the best place, as the axis of the new opening then corresponds to that of the natural pupil. When a lateral opening is to be made, in consequence of the circumference of the cornea only remaining transparent, the nasal side of the iris should be chosen on the level of the natural pupil; then comes the temporal side. The normal place of the opening is nearer to the nasal than to the temporal edge of the cornea: the axis of vision, therefore, with a pupil in the former situation, coincides more nearly with that of the perfect eye, than when it occupies the latter place. The next best situation is below the original pupil; but the optic axis then deviates widely from its natural direction. The least favourable position is above; for a pupil is not of much use here, as the upper eye-

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superfluous, by no means advantageous to the patient, and therefore a thankless undertaking. After such an operation, the patient would be obliged to keep the eye closed, in order to see well, because its axis does not correspond to that of the other."—BEER. *Lehre*, vol. ii. p. 196, note. I doubt the correctness of the latter statement.

* *Lib. cit.* p. 51.

lid interferes with it, so that the eye must be turned downwards, and even then sight is imperfect.

When circumstances permit, Mr. Gibson prefers the external angle of the eye for the new pupil, alledging, "that instruments can be used in this part with more facility than in any other part of the cornea; and every advantage is, at the same time, derived from the operation. When this part of the eye has been found opaque, I have formed the pupil, in several cases both at the inferior part of the cornea, and towards the internal angle of the eye. I did not, however, observe, that my patients saw at all more distinctly; on the contrary, when the artificial pupil was formed towards the internal angle of the eye, the sight in my opinion was less extensive; the nose appearing in some measure to curtail the field of vision. I prefer, therefore, the operation at the external angle, in all convenient cases; and if the patients are enabled to read with more certainty by this mode than any other, they can have little reason to be dissatisfied with the slight squint of which it may be productive."[*]

The reasons for making the artificial opening large have been already mentioned. In the majority of cases we should make it as large as we can: in some few instances we must be on our guard not to make it too ample. Juengken[†] says, that it will never be too large if it extends to one-third of the diameter of the iris. Rosas[‡] observes, that in order to secure a permanent opening of sufficient magnitude, the new pupil ought to be made rather larger than the middle size of the normal one; that it would be improper to make it much larger, and to extend it beyond one-third of the iris, since the impulse of light would be too powerful, and would destroy the sensibility of the retina.

Since the changes of structure requiring the operation for artificial pupil are generally caused by severe or repeated inflammations, which leave the organ more susceptible of future attacks; and since the violence inflicted on the iris in the operation is a serious exciting cause of inflammatory disorder, we should omit no precaution calculated to prevent its occurrence. We must carefully prepare the patient before, and watch the case closely after the operation. The observations on these points, in reference to the operation for cataract, are equally applicable to that of artificial pupil: the only difference is, that the greater probability of inflammation requires greater care in the latter instance.

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[*] *Lib. cit.* p. 50, 51.

[†] *Lehre von den Augenoperationen*, p. 635.

[‡] *Handbuch*, vol. iii. p. 333.

The differences in the states of the eye, which render the formation of an artificial pupil necessary, require corresponding diversities in the mode of accomplishing the purpose. The combinations of the various derangements already specified are so numerous, that almost every case presents something peculiar and individual. Hence the methods, which have either been practised, or devised and described, are very numerous. Mr. GUTHRIE mentions nearly fifty in his work* on this subject; and the list might be now augmented. I do not deem it necessary or advantageous to enter into all these details, and shall therefore confine myself to the general plans of proceeding, without

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* *A Treatise on the operations for the formation of an artificial pupil*; London, 1819. Also, *Lectures on the operative surgery of the eye*, 1827.

The following works may be consulted:—GIBSON, *Practical Observations on the formation of an artificial pupil*, &c. London, 1811. SIR WILLIAM ADAMS, *Practical Observations on ectropium, on the modes of forming an artificial pupil*, &c. 1814. SIR WILLIAM ADAMS, *Treatise on artificial pupil, in which is described a series of improved operations for its formation*, &c. 1819. *Observations on the operation for artificial pupil, illustrated by cases and engravings*; by E. RYAN, M.D. in the second volume of the *Dublin Hospital reports and communications in Medicine and Surgery*. J. A. SCHMIDT, Ueber Pupillenbildung mittelst Einschneidung der Iris (*coretotomia*) mittelst Ausschneidung der Iris (*coretonectomia*) und mittelst Ablösung der Iris (*coretodialysis*) nebst einem Zusätze von K. HIMLY; in HIMLY und SCHMIDT's *Ophthalmologische Bibliothek*, vol. ii. p. 1. BEER, *Ansicht der staphylomatosen metamorphose des Auges, und der künstlichen Pupillenbildung*, Wien, 1805. *Nachtrag*. 1806. BEER, *Lehre der Augenkrankheiten*, vol. ii. section iii. chap. ix. LANGENBECK, *Ueber Pupillenbildung*, in *Neue Chir. Bibl.* vol. i. 197. *Nachtrag zur künstlichen Pupillenbildung*, ibid. p. 676. SCHLAGINTWEIT, *über den gegenwärtigen Zustand der künstlichen Pupillenbildung in Deutschland*; Münich, 1818. WAGNER *de coremorphosi, sistens brevem methodorum ad pupillæ artificialis conformationem hucusque adhibitorum adumbrationem*, &c. Brunswick, 1818. KROHN *de iridodialysis operatione, instrumentisque in ea adhibendis*; Berlin, 1826. 4to. ASSALINI, *Ricerche sulle pupille artificiali con cinque tavole incise in rame e colorite*; Milan, 1811. 4to. 2nd edition, 1818. DONEGANA, *Della pupilla artificiale ragionamento corredato di osservazioni, e rami*; Milan, 1809. 8vo. QUADRI *annotazioni pratiche sulle malattie degli occhi*; Naples, 1819. 4to. WAGNER, *Kritische Revision der neueren Verhandlungen über die künstlichen Pupillenbildung* in GRAEFE *und* WALTHER's *Journal*, vol. iii. 1822. JUENGKEN, *Lehre von den Augenoperationen*; Berlin, 1829. Kap. 22. ROSAS, *Handbuch*, vol. iii. § 390—442.

In his *Chirurgische Kupfertafeln*, DR. L. F. VON FRORIEP has delineated all the various instruments hitherto devised for the operation of artificial pupil, and has given other figures relating to the same subject. Several instruments used in incision and excision of the iris are represented in Plate 193, Part 39. The numerous figures of Plate 199, Part 40, relate to the operations by excision and separation. Plates 228 and 229, in Part 45, are devoted to the same subjects. Plate 270, in Part 53, exhibits the instruments employed by LUSARDI, and described in his *Mémoire sur la cataracte congéniale*, &c. Paris, 1827. The Plates considering all the modifications which may be required in particular cases.

OPERATIONS.

There are three principal methods, viz. *incision*, *excision*, and *separation*, to one or the other of which, or to a combination of them, all the proceedings hitherto proposed, however apparently various, may be referred.

OPERATION BY INCISION; KORETOMIA, (from κορη, pupil, and τομη, section;) IRIDOTOMIA.

Synonymes: *Corotomia, coretotomia.*

Method of Cheselden..—CHESELDEN has shortly mentioned, in the *Philosophical Transactions*, a proceeding which he adopted in two instances of closed pupil following the operation of depression. He introduced a narrow knife, or, as he calls it, "a sort of needle, with an edge on one side," through the sclerotica, as in the ordinary operation of couching, and then brought it forwards through the iris into the anterior chamber. "This done," says he, "I turn the edge of the needle, and cut through the iris as I draw it out."*

WENZEL'S *operation*.—Baron WENZEL, having employed the method of CHESELDEN without success, adopted a different proceeding, in which incision of the iris was performed through the cornea, and was combined with excision. He made an opening of the cornea with the cataract knife, as in extraction; but, after puncturing this part, he carried the point of the knife through the iris, then brought it out again into the anterior chamber at a short distance from the point of entrance, and subsequently completed the corneal section, as in extraction, thus at the same time dividing the iris, so as

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above-mentioned contain also numerous figures representing the appearances of the pupils before and after operation in several cases. The methods of operating are mentioned at more or less length in the description of the figures.

* *Philos. Trans.* No. 402, p. 451. *Philos. Trans. abridged*, vol. vii. p. 493. The two pupils, which are elliptical and transverse, are represented in figs. 67 and 68. Fig. 69 represents the eye with the instrument carried through the sclerotica. The latter figure is repeated in *the Anatomy of the Human Body*, tab. 36, fig. 1, p. 317. In the explanation, Mr. CHESELDEN says, "This operation I have performed several times with good success; indeed, it cannot fail when the operation is well done, and the eye no otherwise diseased, which is more than can be said for couching a cataract."

to make a small flap, which is then cut off by a small scissars introduced under the cornea.*

JANIN'S *operation.*—JANIN tried the operation of CHESELDEN unsuccessfully. The fibres of the iris did not retract, so that the incision which he had made appeared as a simple line; he says that the wounds cicatrised completely. Having accidentally wounded the iris with the scissars in operations of extraction, he found that the openings thus made did not close, and that they did not subsequently interfere with vision. Hence he was induced to adopt a new method of forming artificial pupils. He opened the lower half of the cornea, as in extraction. Then, elevating the flap of that membrane, he introduced under it a curved scissars, one end of which was pointed. He penetrated the iris with this pointed end, about one line from its greater circumference, then carried the instrument directly upwards, and half a line from the original pupil towards the external angle, and divided the iris by closing the blades of the scissars, so as to form an opening about two lines and a half in extent. He adopted this proceeding successfully in many instances, which he has detailed.† In some of them cataract existed, which he extracted through the new pupil.

Operation of SIR W. ADAMS.—The formation of an artificial pupil by incision through the sclerotica, which had fallen completely into disuse, was revived and improved by SIR W. ADAMS, who devised for the purpose a very small knife, which he calls an iris scalpel. It is less than a line in width, with a straight back and sharp point. The edge is convex towards the point, like that of a scalpel, and cuts back towards the handle for about three lines.‡ The iris scalpel may be made still narrower than is mentioned above. In his last work on artificial pupil, SIR WILLIAM thus describes his mode of employing the instrument. The patient is seated, the upper lid raised by an assistant, while the lower is depressed, and the globe fixed by the operator. "The iris scalpel already described, with its edge turned backwards, must be introduced through the coats of the eye at their external part, about a line behind the iris, and in the transverse diameter of the latter membrane. The point of the instrument should then be made to penetrate through the iris, into the anterior chamber, in a line with its central diameter, and somewhat less than one-third of the width of that membrane, from its ciliary margin. The iris scalpel is then to be carried cautiously through the anterior chamber, towards the inner canthus, keeping its edge in contact with the iris (in order to prevent the point from piercing the internal part of the cornea) until it has traversed more than two-thirds of the width of the iris, when it should, with great care, be drawn backwards, almost out of the eye, making the most delicate pressure with the edge of the instrument against the iris, lest it should be detached from the ciliary ligament. If the division of the iris is not effected to a sufficient extent, during the first effort, the iris scalpel should be again carried forward, and withdrawn in a similar manner. This is to be repeated as often as may be necessary to effect a division of the iris, to the extent of a third part of its diameter. In my work, published in 1812, I directed that two-thirds at least of the extent of the transverse diameter of the iris should be divided, in order to guard against the supposed disposition of that membrane to reunite; but abundant experience of the favourable results of this operation, which have since occurred in my practice, has convinced me that no such apprehension need be entertained, and that a division of one-third the extent of the diameter of the iris, is sufficient. Indeed, so far is there from being a disposition in the newly-formed pupil to close again after it has once been established, that the very reverse is the case; for the radiated fibres sometimes contract in a greater degree from delay; whereby the artificial pupil is proportionably enlarged. In the species of case now under consideration, an almost immediate contraction of the radiated fibres of the iris usually takes place, after that membrane has been divided, which produces a new pupil of a sufficient size for all the purposes of vision."*

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* *Treatise on the cataract*, translated by Mr. WARE, sec. 27.

† *Mémoire sur l'imperforation de l'iris, dans lequel on indique le moyen qu'on doit employer pour faire une ouverture à cette tunique, lorsque la pupille est detruite; in Mémoires et Observations Anatomiques, physiologiques and physiques sur l'œil.* 1772, p. 177—205.

‡ Sir W. ADAMS has given two views of this instrument in his *Practical Observations on Ectropium*, &c., plate iii. fig. 1 and 2.

In order to avoid the long ciliary artery, the sclerotica should be pierced a little above or below the middle transverse line of the eye.

Incision of the iris, according to this description, seems a simple affair; it is not however always easily accomplished. When the lens has been previously lost, as in closed pupil consequent on cataract operations, or if the vitreus humor should not possess its usual consistence, the iris, being unsupported, is not divided, but yields to the pressure of the knife, and is carried back into the vitreus humor; if the pressure be increased, it easily separates from the ciliary ligament. Hence it is necessary to draw the edge of the knife along the surface of the iris with as little pressure as possible, and to repeat this movement, until the purpose is accomplished. In so doing, care must be taken not to enlarge the opening in the sclerotica, as the vitreus humor might escape through it. When the texture of the iris is healthy, and more particularly if its fibres are on the stretch, it is easily divided; the edges of the incision retract immediately, and leave an oval opening of good size. If the iris be thickened and hardened by previous disease, and if it should be still further strengthened by adhesion to a thick and tough capsule, its division, by means of the iris scalpel, may be impracticable. When, however, the iris is thus changed in structure, it will usually be found that the retina has been involved in the mischief, and consequently that an operation is not advisable.

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* *A Treatise on Artificial Pupil*, &c. 1819; p. 34—36.

If there should be an opaque capsule adherent to the iris, one and the same incision will divide both. If the new pupil should be more or less obstructed by the capsule, it may perhaps admit of division or detachment by the iris scalpel.

When the closed pupil is complicated with cataract, SIR W. ADAMS recommends that the capsule and lens should be freely divided with the iris scalpel. "The larger portion of the fragments should then be brought into the anterior chamber, and the remainder left between the edges of the divided iris, so as to prevent their reuniting by the first intention."[*] In this complicated proceeding, considerable violence is offered to the organ, and the iris is also subjeced to pressure, a description of injury which generally causes inflammation of the membrane. I consider it preferable to leave the cataract in its place for absorption, and, if necessary, to depress or break it up further in another operation, after the lapse of some time.

MAUNOIR'S *mode of incision.*—The method of performing incision of the iris, by means of scissars, which was practised by JANIN, was adopted and improved by J. P. MAUNOIR,[*] of Geneva, who has described it in two memoirs.

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[*] *Lib. cit.* p. 38.

[†] *Mémoire sur l'organisation de l'iris et l'operation de la pupille artificielle,* Paris, 1812. *Mémoires sur les amputations, l'hydrocèle du cou, et l'organisation de l'iris;* Genève, 1825. *Observations and cases relating to the operation for artificial pupil; in a Letter from* MONSIEUR MAUNOIR, of Geneva, in the *Medico-chirurgical Transactions,* vol. vii. p. 301. *Further account of the result of an operation for forming an artificial pupil; Medico-chir. trans.* vol. ix. p. 382.

It was approved and strongly commended by SCARPA[*] in the last edition of his work on diseases of the eye, from which I have drawn the following description of it, as being more clear and connected than that given by its author. "In order to attain the object proposed, this learned and expert oculist has had scissars made of a delicacy and fineness hitherto unequalled in the construction of surgical instruments.[†] The blades of the scissars are slightly inclined to the handle, (at an angle of 140°.) The upper blade, or that which is designed to pass through the anterior chamber of the aqueous humor between the concavity of the cornea and the iris, terminates in a small button. The lower blade for perforating the iris and advancing along the posterior surface of this membrane, has a very sharp point similar to that of a lancet. The thickness of the two blades united does not exceed that of an ordinary fine probe. The mode of operating with it, as is practised by Professor MAUNOIR with great success, and which has been advantageously repeated in this hospital, is as follows.

The patient being placed horizontally with his head a little raised, a position no less commodious in the operation for the extraction of the cataract, than the formation of the pupil, and supposing the cornea to be perfectly transparent, and the capsule and lens in the case of cataract to have been completely removed from the axis of vision, an incision is made in the cornea at its lower or lateral segment, as may be most convenient, of half the extent of that which is usually made for the extraction of the crystalline lens. Through this small opening in the cornea, the scissars are to be introduced closed, with the flat part in a line parallel to the transverse diameter of the iris; and as soon as the point of the instrument has advanced near to the great margin of the iris, that is to say, nearly opposite the small incision made in the cornea, it is gently opened, and inclined in such a manner that the inferior pointed blade may perforate the iris, and run along the posterior surface of that membrane, until the small button of the upper blade has reached the part where the cornea and sclerotica unite. The iris is then to be divided in its transverse diameter by a single stroke passing as nearly as possible through its centre. This incision being executed, another is to be expeditiously made, so far diverging from the first that the two incisions may form in the centre of the iris a triangular flap of the figure of the letter V, the apex being precisely in the centre of the iris and the base near its greater margin." "On opening the eye operated on five or six days after, the apex of the triangular space is found to have retracted towards its base, leaving in the middle of the iris an artificial pupil of the figure of a parallelogram, or of a crescent, with the cornua directed to the great margin of the iris, when the apex of the divided portion has not completely shrunk towards its base." *

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[*] *Treatise on the principal diseases of the eyes;* chap. xvi.; on the artificial pupil.

[†] *Mém. sur l'organisation de l'iris,* &c. fig. 14. SCARPA's *Treatise;* pl. iii. fig. 8 and 9.

According to M. MAUNOIR, the triangular portion of the iris, included between the two incisions, sometimes retracts immediately and suddenly. In the first case on which he operated, he says, "A very interesting circumstance occurred immediately after the second incision; the flap or portion comprised between the two incisions rolled itself up, or appeared to do so, like the spring blind of a window-carriage, leaving at the moment a free opening for the passage of light."†

When partial opacity of the cornea exists with synechia anterior, the mode of proceeding is a little altered. "To remedy this morbid state, it is necessary to have the scissars of MAUNOIR made with the points of both blades terminating in a button. A small incision being made in the cornea at the most commodious part, according to the rules before laid down, and the scissars introduced closed, an attempt is to be made to free the adhesion which the iris has contracted to the cornea by them; which, if it is effected, the natural pupil in general recovers its former situation and size; but, if the adhesion of the iris to the cornea is very firm, the operation is to be completed in the following manner. One of the blades, by means of the small button, is introduced within the contracted natural pupil, and conducted behind the posterior surface of the iris, until the other blade, defended in the same manner, has reached the confines of the cornea with the sclerotica. The iris is then to be divided in the form of the letter V, without at all injuring either the capsule or lens, both of which have preserved their transparency. It is asserted by some able operators, and men of careful observation, that in this case a simple incision alone is requisite, in order that the pupil may recover its proper size, and maintain it, provided, how-

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* *Treatise*, &c. p. 378—380. Figures of pupils formed in this way are given in the two French publications of M. MAUNOIR already quoted.

† *Mém. sur l'organisation de l'iris*, p. 38.

ever, that such incision strictly include the orbicular muscle of the natural pupil."*

If the closed pupil should be complicated with cataract, it is recommended that the opaque lens and capsule should be cut through by the scissars, together with the iris; and that the fragments of the lens should then be extracted. The practicability of dividing the lens in this manner may be doubted; but, if the cornea and anterior chamber be nearly in their normal state, the incision of the former might be made large enough to allow of the lens being removed through the artificial pupil. This object was successfully accomplished in two of the cases related by M. **Maunoir** in the *Medico-Chirurgical Transactions*, vol. vii.; also in another instance detailed in vol. ix.

When the fibres of the iris are tense, as in closed pupil after cataract operations, or from large prolapsus, and the texture of the membrane is at the same time healthy, the double incision will not be necessary. A single vertical or horizontal incision will suffice; the edges of the cut will retract so as to leave a pupil of sufficient size.

The method by incision is best adapted to the cases in which the anterior chamber and cornea are in the normal state, and the lens has been removed; that is, to closed pupil after cataract operations; also to contraction or closure of the aperture from prolapsus near the circumference of the cornea. M. **Maunoir** employed this proceeding in cases of leucoma with synechia anterior; it is practicable, if a considerable portion of the cornea be still transparent, not otherwise.

OPERATION BY EXCISION; CORECTOMIA (from κορη, pupil, and εκτομη, excision;) IRIDECTOMIA.

Synonyme: *Coretonectomia.*

The object of this proceeding is to form an opening for the passage of light by cutting out a portion of the iris. What is thus removed may include a part of the natural pupil, or not.

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* *Lib. cit.* p. 384, 385.

The excised portion may be taken from the centre, or towards the circumference of the iris; in other terms, the excision may be *central* or *lateral*. The operation of Wenzel, already described, (see p. 466,) is a modification of central excision. Arneman[*] proposed to cut out a circular portion with the concave scissars; and complicated instruments, in which scissars and hooks have been combined, have been devised, I do not know whether they have been used, by others.[†]

Beer[‡] made a small incision in the cornea, introduced a fine hook or a toothed forceps into the anterior chamber, seized the iris, drew it out, and then cut off the portion thus displaced with scissars.

Gibson's *operation*.—Mr. Gibson's proceeding was nearly the same as that of Beer: it was modified according to the different states of the eye requiring the operation. He used, besides a cataract knife for opening the cornea, a small hook, a pair of small forceps, and iris scissars with one or both ends blunt. The most favourable case is central leucoma of the cornea, with the pupil unadherent, and the lens and capsule transparent. "The first step of the operation is to secure the eyelids, as in the operation for extracting a cataract. A puncture is then to be made in the cornea with a broad cornea-knife, within a line of the sclerotica, to the extent of about three lines. All pressure is now to be removed from the eyeball, and the cornea-knife gently withdrawn. The consequence of this is, that a portion of the aqueus humor escapes, and the iris falls into contact with the opening in the cornea, and closes it like a valve. A slight pressure must now be made upon the superior and nasal part of the eyeball, with the fore and middle fingers of the left hand, till at length, by an occasional and gentle increase of the pressure, or by varying its direction, the iris gradually protrudes, so as to present a bag of the size of a large pin's head. This protruded portion must be cut off with a pair of fine curved scissars, and all pressure at the same time removed; the iris will then recede within the eye, and the portion which has been removed will leave an artificial pupil more or less circular.

It sometimes happens, that the whole breadth of the iris to the border of the natural pupil is protruded and removed this way. This I consider as rather an advantage, because it ensures a large pupil, though generally one which is oblong in its shape. I have found, however, the mere circumstance of shape to be of little consequence in this operation, and always to be sacrificed to the object of size. It may also be remarked, that the opening has no disposition to close, when, in forming the artificial pupil, the border of the natural pupil is divided. It occasionally happens, also, that as soon as the knife is removed, the muscles of the eye-ball act with violence, and project a small staphyloma or bag of the iris through the incision. If this bag be not large enough to form the new pupil, the iris must be further protruded by gentle pressure.*

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[*] *System der chirurgie*, ii. p. 199.

[†] Kunstmann in Graefe *und* Walther's *Journal*, vol. i. p. 519. Reisinger, *Meine Hakenscheere zur Bildung künstliche Pupillen, und ihr Schicksal*; in the *Baiersche Annalen*, B. I. St. i. p. 121. Tab. III. fig. 1—7.

[‡] *Ansicht der staphylomatösen metamorphose des auges*, &c. p. 114.

The incision in these cases should be made close to the edge of the sclerotica, more especially when the transparent border of the cornea is narrow, that the opacity sometimes following the wound may not encroach on that part of the membrane through which the light will pass into the new pupil. The corneal opening should not exceed the size mentioned above. The protruding portion of the iris should be seized with a small forceps, and snipped off as quickly as possible; it may be previously drawn out further, if the prolapsus should not be sufficient. If the opening, as first made, should not be large enough, the iris may be again drawn out by means of the small hook, and another portion removed.

Adhesions of the iris to the opaque cornea require some modifications in the mode of operating. If one half of the pupil should adhere, the portion next to the transparent part of the cornea generally remains free. One or two points of adhesion may be separated by the knife employed to open the cornea, or by the iris scissars, so as to disengage the pupil partially or entirely. Considerable adhesion will prevent a protrusion of the iris sufficient for our purpose. In that case, we must introduce the small hook, seize the unadherent border of the pupil, draw it out through the puncture of the cornea, and cut off a sufficient portion with the curved scissars.† When the pupil is generally adherent, " the point of the cornea-knife is to be passed through the cornea in the usual way, and is to be directed to those adhesions, the division of which will most effectually tend to render the iris free, for the subsequent part of the operation. Care must at the same time be taken to avoid undue pressure on the eyeball, that the aqueus humor may not escape before that object is accomplished; for otherwise, the cornea and the adhering iris will become flaccid, and the adhesions will be much more difficult to separate.

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* *Practical observations on the formation of an artificial pupil, &c.* p. 39—41.

† *Ibid.* p. 56, 57.

Having separated some part of the iris from its connexion with the cornea, and consequently made an aperture in it, the next step will be to remove a portion of it in a convenient situation. If the iris appear sufficiently loose, the hook may be first introduced through the puncture in the cornea, and a gentle attempt may be made to draw out a sufficient portion from the eye, to be cut off with the curved scissars. If this be found impracticable, the iris must be removed within the eye with the iris scissars.

In using these small scissars, they are to be introduced shut and flat, through the aperture in the cornea; and at the place where the artificial pupil is to commence, a small opening is to be made with them in the iris. Through this opening, the blade of the scissars, which is attached to the long handle and has a blunt point, is to be conducted between the iris and crystalline lens by opening the scissars a little. The other blade is to be passed between the inner surface of the cornea and the iris, until their points reach a little beyond the border of the iris, where it has been separated from its adhesions. This portion of the iris is then to be divided, and the flap thus formed may generally be easily removed by another snip or two with the scissars. By this means an artificial pupil of a triangular or oblong shape will be made, which may easily be enlarged by the use of the scissars, if it should appear too small."*

The iris scissars may be employed in the way just described, in those cases of partial pupillary adhesion, where we cannot draw out the iris with the hook. The operation by detachment and strangulation is, however, more suitable to the two last-mentioned cases.

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* *Practical observations on the formation of an artificial pupil, &c.* p. 66—68.

OPERATION BY SEPARATION.

COREDIALYSIS (from κορη, pupil, and διαλυσις, loosening or separation,) IRIDODIALYSIS.

Synonymes : *Corodialysis*; *Coretodialysis.*

The object of this operation is to form an artificial pupil by separating the iris, at some part of its greater margin, from the ciliary ligament. The method, as first proposed, consisted of simple separation: subsequently, it was found necessary to strangulate the iris, when separated, in an aperture of the cornea, or to cut away a portion of it.

The operation of SCARPA *and* SCHMIDT.—The idea of this operation occurred about one and the same time to two celebrated men, SCARPA,[*] of Pavia, and J. A. SCHMIDT,[†] of Vienna, who tried it in several cases, and published the results of their experience without any knowledge of each other's proceedings. They had observed how easily the iris separates from the ciliary body, so that when it is seized with a pair of forceps in the dead subject, even near the pupil, it gives way at the ciliary margin. They had seen it separated in the same way in the living eye from violence, as in smart blows with a whip, or other similar accidents; from injury in extraction or depression, and even from the dragging of the iris in cases of large prolapsus.

SCARPA used his slender curved cataract needle, and introduced it at the external angle of the eye, two lines behind the margin of the cornea. He carried it behind the iris until its point had reached the upper and internal part of the ciliary margin, which he then perforated, so that the point of the instrument should be just visible in the anterior chamber: if it were further advanced, it would become engaged in the substance of the cornea. The needle was now carried downwards and outwards, moving in a line parallel to the anterior surface of the iris, so as to detach a portion of its margin from the ciliary ligament. When this detachment had been partially effected, he lowered the point of the needle to the inferior angle of the artificial opening, and extended the separation to the requisite length by dragging the iris towards the temple and backwards. If any opaque substance should be seen in the new opening, he advises that it should be detached with the needle, and carried into the anterior chamber.*

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[*] *Saggio di osservazioni ed esperienze sulle principali malattie degli occhi*; small folio. Pavia, 1801. Cap. xvi. The last case detailed in this chapter was communicated by Signor F. BUZZI, of Milan, and gives the history of a closed pupil consequent on extraction, in which he formed an artificial pupil by separation, in the year 1788. He used the common spear-shaped cataract needle, which he introduced through the sclerotica, as in depression. He perforated the iris from behind in its upper part, about a line above the closed pupil, carried the instrument parallel to the anterior surface of the iris, and then directing its point downwards and backwards, detached the iris for at least one-third of its circumference, on which the anterior chamber became filled with blood. There remained an oblong artificial pupil, and the patient was able to read and write with cataract glasses. *Osservazione* 62, p. 212, 213.

[†] *Ueber Pupillenbildung, &c.* in HIMLY und SCHMIDT's *Bibliothek*, vol. ii. Stück 1, p. 1. Jena, 1803. This essay, in which six cases of the operation are detailed, was read at the Josephine Academy in Vienna, on the 21st of September, 1802.

Schmidt says, that for ten years he had formed artificial pupils in several instances annually, by the method both of **Janin** and **Wenzel**; but that even where he had reason to expect favourable results, he had been disappointed in seven or eight out of every ten cases. The cause of failure was generally the effusion of lymph, and the consequent formation of an adventitious opaque substance in the new opening.† The following facts awakened his attention to the possibility of forming artificial pupils in another way. In 1792 he saw a coachman, whose left eye had been struck with a whip six months before. The iris was separated from the ciliary ligament to a considerable extent on the nasal side. The natural pupil was collapsed, (*considentia*, *synizesis pupillæ*,) with a cataract behind it. The new opening, which was of a clear black, contracted and dilated according to the degree of light, so that the patient enjoyed clear and distinct vision. In 1795, a similar instance occurred in a youth of sixteen, who had been struck on the eye by a hard ball. A considerable detachment of the iris on the temporal side had ensued, with collapse of the pupil and cataract. Through the artificial opening, which was clear, and contracted, and dilated like a natural pupil, the smallest objects could be seen distinctly. In 1797, an officer received a severe injury of the eye from a shot. The iris was separated at its lower part and torn through, so that the laceration and the normal pupil formed one large opening, occupied by an opaque lens, below which the posterior chamber was clear. This patient took up a book, closed the sound eye, and read small print.[*]

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* *Lib. cit.* p. 208, 209.

† *Ibid.* p. 23, 24.

In his first attempt, which was in 1802, SCHMIDT made an opening in the cornea, seized the iris with forceps, and thus separated it from the ciliary ligament.[†] He afterwards adopted a proceeding almost exactly similar to that of SCARPA.[‡]

The separation of the iris from the ciliary body has sometimes been effected by means of a curved needle, or a hook, introduced through the cornea.[§]

Subsequent experience induced SCARPA to think less favourably of the operation by separation, which he seems, from the following passage in the last edition of his work, to have abandoned altogether. "Experience, to which all theory is subordinate, has since convinced me that, independently of the mode of operating which I proposed, being inapplicable, of which I was aware, to the greater number of complicated cases of closure of the pupil, I was also mistaken with regard to the most material point in the operation, that is, the permanency of its success; as I have since found that the marginal pupil or opening which is formed by the detachment of the greater circumference of the iris from the ciliary ligament, from being oval, becomes in process of time *filiform*, and consequently useless"[||]

This closure of the unnatural opening caused by detachment of the iris is exemplified in the case of JOHN O'BRIAN, related at p. 137 of the present work.

Professor ROSAS justly observes, that "the objections to the detachment of the iris through the sclerotica are so obvious, that they were soon observed and appreciated by the proposers of the method. The very extensive injury inflicted on an organ already weakened in most cases by serious previous disease, the unavoidable destruction of the lens, the great difficulty of bringing the needle into the anterior chamber exactly at the ciliary margin of the iris, the almost inevitable passage of the needle into the cornea, the difficulty of effecting an adequate detachment of the iris from the painful nature of the process, and the consequent unsteadiness of the patient, and the subsequent closure of the newly-formed pupil in spite of all precautions, are disadvantages belonging to the operation of SCHMIDT and SCARPA, which seriously diminished its value in the estimation of well-informed and unprejudiced surgeons."

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[*] *Lib. cit.* p. 27—29. Several other cases of unnatural pupil consequent on accidents, in which the iris had been detached from the ciliary body, are quoted by HIMLY, *ibid.* p. 50—52. JANIN has four instances of similar separation in his *Observations et dissertations sur le décollement de l'iris considérée comme contiguë, et non continue à la choroïde.* He observes that HOIN of Dijon had found by repeated trials in human eyes and those of animals, that the iris, when held with forceps and gently drawn, separates easily from the choroid without injury to either part. *Mémoires, &c. sur l'œil,* p. 415.

[†] *Lib. cit.* p. 30, 31.

[‡] *Ibid.* p. 41.

[§] BONZEL in HUFELAND und HARLES *Journal der practischen Heilkunde,* January, 1815. WAGNER *de Coremorphosi,* p. 36, 1818. LANGENBECK, *Neue Chir. Bibl.* vol. i. p. 221. BEER performed iridodialysis from the front; but he pierced the sclerotica, and carried the needle into the anterior chamber on the temporal side of the eye. *Nachtrag zu seiner ansicht der staphylomatosen metamorphose, &c.* This proceeding has not been repeated by other operators; nor can it be considered worthy of imitation. HIMLY had also separated the iris from the front, having carried his needle through the adventitious membrane, by which the pupil was closed. *Ophthalmologische bibliothek,* vol. iii. st. 2, p. 160.

[||] *Treatise,* &c. translated by Mr. BRIGGS. Second Edition, p. 368.

THE OPERATION BY DETACHMENT AND STRANGULATION.

As the simple separation of the iris from the ciliary ligament cannot be depended on for the formation of a permanent opening, except perhaps in the case of its being effected in the upper part, because experience teaches us that the detached iris generally resumes its former position, either soon after the separation, or at a rather later period, particularly during the inflammation, it is necessary to adopt some further means for maintaining the artificial aperture. LANGENBECK proposed for this purpose the strangulation of the detached iris in the wound of the cornea; while ASSALINI cut off the prolapsed portion, after dragging it through the cornea.

LANGENBECK's *operation.*[*]—This plan of detaching the iris (*iridodialysis*) by means of instruments introduced through a wound of the cornea, and then strangulating the detached portion in the aperture had been called *iridencleisis*, (from ιρις and εγκλειω, to lock in or confine.) It consists in making an opening in the cornea; in detaching the iris by means of a hook, or some other instrument introduced into the anterior chamber through that wound; in drawing the detached portion through the corneal wound, and leaving it there as a prolapsus, so that it may become permanently fixed to the cornea, and thus prevent the subsequent closure of the new pupil.

The first step in the operation, that of making a small opening in the cornea, may be conveniently accomplished by

[*] *Neue Chir. Bibl.* vol. i. p. 224—240.

means of BEER's cataract knife. This wound must be large enough to allow the passage of the hook; but it should not extend beyond that size, otherwise we shall not succeed in strangulating the iris. It may be one and a half or two lines.

The incision should be distant from the point at which the separation of the iris is to be effected, by one half the diameter of the cornea at least; some advise that the distance should be three-fifths of the diameter. If the wound of the cornea should be nearer to the new pupil, its cicatrix may interfere with the transmission of light through the aperture; if it be further, too large a detachment of the iris will be necessary, and the extent of injury to the organ will be thus increased without any object.

The situation at which the detachment of the iris is to be effected, will determine the place and direction of the small opening in the cornea. If the new pupil is to be made on the nasal or temporal side of the eye, the cornea must be opened in its middle by a vertical incision; if at the upper or lower part, the incision must be horizontal, and a little above or below the middle. If the circumstances should require it, the incision may be made in a leucomatous portion of the cornea.

The point of the knife, directed at a right angle to the surface of the cornea, must be carried through it into the anterior chamber: the handle must then be depressed, so as to bring the blade into a direction nearly parallel to the surface of the iris, in which it is to be pushed on until an opening is formed of the size already mentioned. The point of the knife should then be moved a little towards each angle of the wound, so as to make the division of the internal laminæ equal in extent to that of the external. The instrument should then be withdrawn quickly, so as to prevent the escape of the aqueus humor.

A great variety of contrivances have been employed for the purpose of seizing and detaching the iris. On this subject, JUENGKEN has sensibly observed, "that amidst the multitude of instruments invented, modified, and changed, often very ingeniously, for the purpose of iridodialysis, the most important point has been overlooked, namely, that for holding the iris securely, the kind of instrument is of less consequence than the place at which the part is seized. I confess that, until instructed by repeated experience, I had not sufficiently appreciated this circumstance. The texture of the iris is very different at its pupillary and ciliary margins. In the former it is fine, delicate, and so soft, that instruments easily tear out without separating the iris from the ciliary ligament. In the latter it is of firmer texture, so that the finest instruments will hold when fixed in it; and the nearer we come to the margin, the more easy is the detachment. When the lens and its capsule are in their normal state, we run the less risk of injuring them the nearer we fix the instrument to the ciliary ligament, because the vitreus humor is behind the latter part, and not the crystalline capsule. Hence, for performing iridodialysis, that instrument is best suited, with which we can come nearest to the circumference of the iris, so as to seize it close to the ciliary ligament; and no one can deny that a simple fine hook is the best for this purpose. If, however, the iris should have become changed in texture, and soft throughout, no kind of hook will answer the purpose, whether single, double, or covered; our resource, then, is to seize the iris with forceps, and thus effect the detachment. It has been objected to the simple hook, that its point may pass between the corneal laminæ and become entangled. This may equally happen with any other instrument, if attention is not paid to the direction in which it is carried through the wound of the cornea. It is a great mistake to suppose that the performance of iridodialysis is more difficult with the simple hook than with other instruments: on the contrary, it is more easy, when the mode of employing it is well understood."*

The hook must be carried through the wound of the cornea at right angles, like the knife, the convexity of the curve going first, and the point following. When it has entered the anterior chamber, the handle should be depressed, so that the hook may lie flat between the cornea and iris, with its point downwards, and in this direction it must be carried on to the very margin of the iris, when it will be nearly concealed by the edge of the sclerotica. It must now be turned, so that the point may be directed against the iris: it may then be fixed by gentle pressure, and afterwards drawn a little back, so that the hooked portion of the iris may be safely placed in the concavity of the instrument. When we find that the iris is securely seized, the hook must be turned flat again, but with its point directed upwards, that the iris may not slip off. The point should indeed be directed a little towards the cornea, to avoid the lens, if it be present. We now detach the iris by drawing the hook backwards through the wound of the cornea very slowly and carefully. In carrying it out of the eye, we must give the instrument the same direction as that in which it entered. The convexity of the hook must be drawn out through the inferior angle of the wound, and the point will then pass without any risk of catching in the wound. Having conveyed the hook with the iris safely through the wound, we continue to draw it gently in the same direction, until we have got an artificial pupil of sufficient size. We now cease to draw the iris, and observe whether it remains fixed in the wound of the cornea. If it does so, we detach the hook, and the operation is finished.

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* *Die Lehre von den Augenoperationen*, p. 656, 657.

The new pupil becomes filled with blood, which begins to flow when the detachment of the iris commences, and soon occupies the whole anterior chamber. The cases are rare, in which the effusion is inconsiderable, and still more uncommon where it does not occur at all. This hemorrhage, which proceeds from the external arterial circle of the iris formed by the primary branches of the long ciliary arteries, has no unfavourable influence on the result of the operation. The blood, as in other effusions into the anterior chamber from accidental violence,* is removed by absorption in a few days.

REISINGER's *double hook, or hooked forceps, for detachment of the iris.*—The iris is sometimes torn by the hook, instead of being detached. To avoid this inconvenience, Dr. REISINGER,† of Landshut, devised an instrument formed of two branches united like those of forceps. Each of these terminates in a small hook. When the branches are pressed together, the two hooks, having the same size and direction, lie close together, so as to form a single hook; when the pressure is discontinued, they separate again. This instrument, with its branches approximated, so as to form a single hook, is carried through the wound of the cornea into the anterior chamber, and pushed on like the simple hook to the ciliary ligament. It is now partially turned, so as to direct its point against the iris, when the discontinuance of the pressure on the branches allows the two hooks to separate: they are then fixed in the iris in the same way as when the simple hook is employed. The branches, being again pressed together, hold the portion of iris included between the two hooks in the manner of forceps, while the hooks fixed in its substance render the hold still more secure. The instrument is now to be turned so as to lie flat against the cornea, with the convexity downwards and the points upwards; it is then to be carried back through the wound steadily and gently, so as to effect a sufficient detachment of the iris.

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* See p. 137—140. In a case where the iris had been thickened by inflammation, Dr. RYAN made an artificial pupil by incision, according to the method of SIR W. ADAMS. The anterior chamber became obscured by an effusion of blood, which was completely absorbed on the third day.—*Dublin Hospital Reports*, vol. ii. p. 364. The anterior chamber became filled with blood in another instance, after the operation of incision. The effused blood was completely absorbed in twenty hours.—*Ibid.* p. 368.

† *Darstellung eines neuen verfahrens, die Mastdarmfistel zu unterbinden, und einer leichten und sichern Methode künstliche Pupillen zu bilden.* Augsburg, 1816.

On this double hook, or hooked forceps of Reisinger, Professor Rosas[*] makes the following remarks:—"Nobody, who has tried this plan, can have failed to observe, that the use of the double hook is attended with greater difficulties, and yet presents fewer advantages than the simple hook of Langenbeck. That the iris may be securely seized and detached, the points of the instrument must be turned directly backwards, so that the iris cannot be hooked near enough to its circumference, and the lens is generally seized at the same time. These inconveniences are avoided with the single hook, which can be entered obliquely into the ciliary margin of the iris. The instrument, strictly speaking, does not act as a double, but only as a single hook, for when its branches are opened, they will be found to have separated the fibres of the iris, so that there is a mere empty space between them. In unsteady patients there will be a greater danger of the instrument becoming entangled, or the iris escaping, than with the simple instrument. We cannot rely on its action as forceps in giving a firmer hold of the iris."

Unless the opening in the cornea be carefully made, and similar attention be paid to the other steps of the operation, the fine hook employed for seizing and detaching the iris may become entangled in the sides of the wound, or within the anterior chamber. To obviate this risk, various complicated instruments[†] have been devised, with contrivances for covering the point of the hook, or at least placing it in such a situation as to prevent it from catching in the parts along which it passes. I agree with Juengken[*] and Rosas,[†] in preferring the simple hook to any of these complicated contrivances.

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[*] *Handbuch der theoretischen und praktischen Augenheilkunde*, vol. iii. § 429.

[‡] These instruments have been designated by the names *coreoncion*, or *coroncion* (from *κορη*, pupil, and *ογκος*, hook,) also *iridoncion*. Langenbeck first employed one of the kind; see his *Beschreibung eines von mir erfundenen instrumentes, die coretodialysis tu verrichten*, in the *Neue Chir. Bibl.* vol. i. p. 454 and 676. The instrument employed by Graefe is described by Juengken in *Das coreoncion, ein*

Operation by separation and excision.—When the iris cannot be strangulated in the wound of the cornea, either in consequence of the opening being too large, or of the iris having been rendered incapable of extension by disease, the portion which has been drawn out of the anterior chamber may be cut off with scissars. This operation, in which excision is united with separation, has been called *Iridectomedialysis.* Assalini,[‡] who first employed it, used a small forceps of peculiar construction for seizing and detaching the iris, introducing the instrument into the anterior chamber through an opening previously made in the cornea. The simple hook, which can be employed with a smaller division of the latter part, is preferable.

"Although," says Professor Rosas, "I do not approve Assalini's method of operating, I think that iridectomedialysis, when performed in a proper way, possesses advantages both over simple detachment, *(iridodialysis,)* and over detachment with strangulation, *(iridencleisis.)* The operation is performed more quickly, not requiring, as the latter operation does, a small and oblique wound of the cornea, nor being attended with falling back and repeated dragging out of the iris. Closure of the newly-formed pupil is less likely. Inflammation and suppuration, or effusion of lymph, occur more rarely than in the other modes of iridodialysis. The wound heals more quickly, and the corneal cicatrix is less extensive and conspicuous than in iridencleisis. These advantages have led me to employ the operation for many years, in the manner recommended by Langenbeck, for cases in which the detached portion of iris cannot be strangulated in the cornea. Still I am of opinion, that its advantages are not

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Beitrag zur künstlichen Pupillenbildung; Berlin, 1807. See also, *Schlagintweit über den gegenwärtigen Zustand der künstlichen Pupillenbildung in Deutschland*; Munich, 1818; in which he describes, under the name of Iriankistron, an instrument very similar to the coreoncion of Graefe. Wagner, *de coremorphosi.* Dzondi *Geschichte des klinischen instituts zu Halle.* 1818, and *Beschreibung eines neuen instrumentes,* &c.; Halle, 1819. The instrument proposed by Emden, in his *Diss. de raphiankistro,* &c. Göttingen, 1819, is a combination of a hook with a lancet-shaped needle. The former, which lies close on the latter, can be protruded and withdrawn again.

[*] *Lehre von den Augenoperationen*, p. 656.

[†] *Lib. cit.* p. 365, note.

[‡] *Ricerche sulle pupille artificiali.* Milan, 1811.

equal to those of MAUNOIR's plan of incision, or of excision, as practised by WENZEL and BEER; and, therefore, that its employment must be restricted to cases in which these methods are not applicable. Such are obstructions of the pupil by central leucoma of the cornea, by accumulation of lymph in and about the aperture, and by an universally adherent cataract. The following are the considerations which make me think the operations last mentioned more advantageous than the iridectomedialysis.

1. The lacerated wound inflicted in this operation, as in all kinds of iridodialysis, is a much more serious injury than the simple cut of incision or excision. 2. The lens is more endangered than in iridectome, so that often we have to treat subsequently a cataract caused by the operation. 3. Inflammation, suppuration, and effusion of lymph are much more frequent after this operation. 4. The cure is more tedious; since the separation is generally followed by copious effusion of blood into the anterior chamber, the removal of which by absorption occupies some time, during which it impedes vision. 5. The marginal pupil, formed by iridodialysis, is much less useful than one produced by incision or excision in the centre of the iris, or near it; since the rays of light falling on the margin of the cornea are much less serviceable for vision than those which go through its middle. Moreover, the ciliary processes, projecting into the posterior chamber, occupy a part of the opening, so that, although the patient is obliged to squint, vision is still very feeble. 6. Iridodialysis can never be performed with advantage where the patient still sees with one eye. 7. For the reasons already given, vision is less lasting than after the other methods."*

The operation by separation may be performed in all the cases requiring the formation of an artificial pupil, to which neither incision nor excision is applicable: and in those, where another operation having been previously performed, the opening has since closed: in central leucoma covering more than half the diameter of the cornea with general synechia anterior; in opacities with partial adhesion, where the transparent portion of cornea is so situated as not to allow of excision.

The combination of excision with detachment is often preferable to the operation of iridencleisis. The former must be adopted where strangulation cannot be effected; also in large synechia anterior, or partial staphyloma, where only a third or fourth part of the iris remains free. It is a preferable method where we expect the operation to be followed by considerable inflammation, as we avoid the irritation which might be expected from pressure on the prolapsed iris. When we intend originally to perform iridectomedialysis, the opening in the cornea should be rather larger than in the operation of iridencleisis. This opening is made in the opaque part, when the case is synechia anterior, occupying half or two-thirds of the cornea. We may be able to direct the knife in such a way as to detach partially the adherent iris, and thus make way for the passage of the hook into the anterior chamber: otherwise, on opening the leucomatous cornea in the adhesion, we penetrate the posterior chamber; the hook must then be introduced behind the iris, and carried through the membrane from behind forwards, for the purpose of detaching it. Great caution will then be necessary to prevent the point of the hook from becoming entangled in the cornea. When the detachment has been effected, the iris should not be dragged through the wound until the operator has the scissars ready close to the eye for cutting it off immediately. In this and many other cases, where the surgeon must employ both his hands in the manœuvres of the operation, the care of the eye-lids must be confided to an assistant.

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* *Handbuch*, vol. iii. § 431—435.

The operation for artificial pupil is simplified when the lens has been previously removed from the eye. In the majority of instances, however, it is still present, either transparent or opaque. It is important, in the former case, to adopt a mode of proceeding, in which no injury shall be offered to the lens or its capsule. This object is completely secured in the operation of excision according to the method of GIBSON. Incision of the iris, with the scissars of MAUNOIR, blunt at both ends, is not quite so safe; and detachment through the cornea (coredialysis) is still more dangerous. If there be cataract, it will be advantageous to adopt a mode of operating, when circumstances will admit, by which the lens may be removed from the axis of vision at the same time that the new pupil is formed. This may be accomplished by the operation of WENZEL, and by MAUNOIR's method of incision. The lens might be depressed, or broken up and left for absorption, in SIR W. ADAMS's mode of incision. It is, however, dangerous to add this violence to the injury which the organ necessarily sustains in the formation of an artificial pupil. In such cases, therefore, as well as in others where cataract is present, it will perhaps be safest to leave the opaque lens in its situation, from which it may be removed afterwards by depression or absorption.

Formation of an artificial pupil in the sclerotica.—When the entire cornea has been rendered irremediably opaque by leucoma, AUTENRIETH proposed to attempt the formation of an artificial pupil in the sclerotica: that is, to remove a portion of the sclerotic and choroid coats, near the edge of the cornea, and thus expose the vitreus humor, in the hope that the wound might be covered by a transparent pellicle, through which light enough might pass into the eye for imperfect vision. After experiments on animals, AUTENRIETH tried it on the human subject.[*] The operation (which has been called *scleroticectome*) has been performed without any useful result by BEER[†] and Mr. GUTHRIE.[‡] Professor AMMON[||] has given a history of all that has been done and written on the subject, and has detailed three cases in which he tried the proceeding. The operation has also been performed by Dr. ULLMANN,[§] of Marburg. No advantage seems to have been gained in any of these operations.

CHAPTER XXV.

AMAUROSIS, AND OTHER DEFECTS OF SIGHT.

SECTION I.—GENERAL OBSERVATIONS ON AMAUROSIS.

THE imperfection or loss of sight, which results from affection of the nervous apparatus belonging to the eye, whether that affection be seated in the retina, the optic nerve, or the sensorium; whether it be idiopathic or primary, sympathetic or secondary; whether it consist in vascular congestion, inflammation, or organic change, or simply in functional disturbance, is called AMAUROSIS. This word, which is Greek, (*αμαυρωσις*, from *αμαυροω*, *obscuro*, to darken,) considered etymologically, means dim or darkened sight; it is a general term, embracing these affections of the nervous visual apparatus in all their forms and degrees. AMBLYOPIA, (*αμβλυωπια*, *hebetudo visus*, from *αμβλυς*, *hebes*, obtuse, dull, and *οψις*, sight) to which the epithet *amaurotica* is sometimes attached, denotes the less considerable degree of the disease, in which objects, even of the smaller size, can be recognized, but are seen imperfectly. The expression, GUTTA SERENA, employed by the writers of the middle ages, is often used as synonymous with AMAUROSIS: it is more properly applied to that full development of the nervous affection, in which complete blindness has been produced; the patient can no longer discern objects however large; he can perhaps distinguish light from darkness, or he may be unable to make that distinction. This term seems to have been derived from the pathological notions formerly prevalent respecting the cause of blindness. It was supposed to result from the effusion of a humour or fluid at or behind the pupil; as the latter opening retained its natural blackness in amaurosis, the effused drop was said to be clear. In the following passage of his address to light, MILTON translates literally this technical expression of *Gutta Serena*—

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[*] L. SCHMIDT *Diss. de pupilla artificiali in sclerotica aperienda*; Tubingen, 1814.

[†] J. S. WEBER *Diss. inaug. sistens observationes quasdam in coretodialysin et pupillam in sclerotica aperiendam*; Tubingen, 1817. ROSAS, *Handbuch*, vol. iii. p. 380. He mentions that the operation had been unsuccessfully performed by RIECKE, and quotes the authority of ROSNER, *Diss. de pupilla artificiali*; Tubingen, 1823, p. 46 and 47.

[‡] *Treatise on the operations for the formation of an artificial pupil*, p. 205.

[||] *Die Sclerectomie oder die künstliche Pupillenbildung in der sclerotica nach eigenen erfahrungen und operationsversuchen dargestellt.* *Zeitschrift*, vol. i. p. 185.

[§] AMMON's *Zeitschrift*, vol. ii. p. 123.

> . . . . "But thou
> Revisit'st not these eyes, that roll in vain
> To feel thy piercing ray, and find no dawn;
> So thick a *drop serene* hath quenched their orbs,
> Or dim *suffusion* veiled."

Suffusion[*] is also a technical term, employed by CELSUS and other medical writers of antiquity, to denote generally imperfection or loss of sight, whether arising from cataract or from affection of the nervous structure. The latter has sometimes been called *suffusio nigra*, or *cataracta nigra*,[†] on account of the natural blackness of the pupil.

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[*] In Greek, *ὑποχυμα* or *ὑποχυσις*, which, as employed by the earlier Greek writers, include amaurosis and cataract; for the cases were not then distinguished. Subsequently, the latter was called *γλαυκωμα*.

[†] The Germans apply the same substantive, *staar*, to cataract and amaurosis, distinguishing them by the epithets *grey* and *black*. Thus cataract is *graue staar*,

Since amaurosis may arise from affections of the sensorium, of the optic nerve, or of the retina, we can understand how it happens that it sometimes appears in both eyes at once; that it may be confined to one, or that, having taken place in one, it attacks the other also after a longer or shorter interval.

Amaurosis may be induced by causes acting immediately on the nervous apparatus of the eye, such as excessive exertion of the organ, or a stroke of lightning; it may arise, secondarily, from sympathy between the nervous structure of the eye, and some other previously affected organ, as from irritation of the stomach, or of the nerve of the fifth pair; or it may be a symptom of affection of the sensorium more or less general. Hence the distinction of the complaint into *idiopathic*, *sympathetic*, and *symptomatic*. According to differences in degree and duration, it is called *incipient* or *recent*, *inveterate* or *confirmed*, *partial* or *imperfect* (*amblyopia*,) and *complete* (*amaurosis* strictly so called, or *gutta serena*.)

It has been divided into *organic*, and *functional* or *dynamic*; the latter being supposed, at least in many cases, to be sympathetic. The distinction might be considered important, if it could be made during the patient's life; unfortunately, we cannot accomplish this. The retina is withdrawn, by its situation, from direct observation; its diseases produce no visible changes in the exterior of the globe, from which we can determine the exact nature of the affection; and, as they do not terminate fatally, we are deprived of the light, which pathological inquiries after death might throw on the subject. Hence it is a mere matter of conjecture, in particular instances, whether the nervous structure of the eye is affected organically or only functionally. Indeed, if we could see the parts it might not be so easy as the familiar employment of these terms implies, to establish the distinction in question; for medical inquirers have not yet determined the exact limits of the changes which they call organic. We apply the epithet functional to those diseases which produce no changes recognizable after death. But we cannot infer in these cases that no alteration had existed during life. The state of an organ necessary to the correct execution of its function is a living not a dead condition; it requires, not merely a certain organization as we find it after death, but a supply of healthy blood

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and amaurosis, *schwarze staar*. The German *staar* is the name of the starling. The Greek καταρακτης, from which *cataract* is derived, is not only applied to a waterfall, but also to a bird of the cormorant kind, perhaps the pelecanus bassanus.

in a certain quantity, a natural state of nervous influence and sympathy, and perhaps other circumstances not clearly understood. If all these conditions are combined, can we consider it possible that the function should be disordered or interrupted? If one or more should be altered or wanting, can the disease be properly regarded as simply functional? Vascular congestion is an obvious deviation from the normal state of a part. If the retina, or any other organ, be said to be functionally disordered, when its vessels appear twice as numerous and large as in the normal condition, the expression must be employed too loosely to convey any clear information. Some restrict the term organic to alterations in the essential structure of an organ, thus excluding changes in the state of circulation, even although they should be visible after death. Since, then, the epithets organic and functional are indefinite, being employed in different senses by different persons; since they do not denote, generally, well ascertained and clearly understood conditions of parts; and since the situation of the nervous apparatus of sight renders it impossible for us to know its exact state in most instances, I consider this distinction of amaurosis to be of no practical utility, but, from its vagueness, rather calculated to mislead.

Amaurosis has been divided into the *continued* and the *intermittent*, the latter being either *periodical* or *irregular*. It has been further distinguished into the purely *local* or *nervous*, and the *complicated*. In the former the affection is confined to the nervous structure; while, in the latter, there is at the same time disease of other textures in the eye, or of other organs. Cataract and strabismus are complications of amaurosis situated in the visual apparatus; the combinations with diseases of other parts, or with morbid constitutional dispositions, may be very various.

General inflammation of the internal tunics, glaucoma, dropsy and atrophy of the globe, and some other affections, are occasionally described as amaurosis complicated with other disorders. I think it better to confine the name of amaurosis to the instances in which disease has commenced in, and been originally confined to, the nervous structure. In course of time other changes, such as cataract, may be superadded to the nervous affection.

The diseases of the nervous apparatus are less understood than those which affect other parts of the eye. They do not come under our immediate observation during the active state of disorder; and we very seldom have the opportunity of exploring, after death, the pathological condition of the affected parts, especially in the instances of most frequent occurrence, where the disease is seated in the retina. Hence the attention of medical observers has been directed to the impaired vision, the various modifications of defective sight, the pain in the eye or head, rather than to those changes in the nervous structure, constituting the real disease, of which these circumstances are merely symptoms. Amaurosis and amblyopia, then, like dyspnœa, indigestion, and jaundice, are merely names of symptoms, with which we are obliged to be contented, in our ignorance of the morbid conditions producing them. Our notions of the nature and treatment of these nervous affections must remain imperfect, until they can be founded on a more correct pathological knowledge of the diseased parts. How should we be able to treat diseases of the lungs or stomach, if we knew nothing more of the matter than the simple fact, that respiration and digestion were disordered and imperfect? Could we expect any beneficial result, if we should follow in these cases the same course which has been often pursued and is still recommended in treating weakened sight, that is, to administer a variety of stimulating and tonic remedies in order to remove the imaginary debility or torpor, on which the weakened function has been supposed to depend?

As the true nature of amaurotic affections is not yet understood, we cannot be surprised at finding that the divisions of the subject, even in modern works, are objectionable. It has been divided into organic and functional, although we are without data sufficient to mark the distinction. Of the latter, the following subdivisions have been adopted, viz.: increased sensibility, diminished sensibility, and paralyzed condition of the structure. As these are merely degrees of impaired function, and may all exist successively in one and the same case, they can afford no proper ground for nosological distinction. Again, species have been established on very questionable, if not obviously erroneous grounds. Thus, in the epileptic, convulsive, and paralytic amauroses of Beer and others, the impaired vision and the concomitant symptoms, from which the specific names are derived, instead of standing to each other in the relation of cause and effect, are merely joint results of common causes. Although Beer has a chapter devoted to the amaurosis caused by certain vegetable bitters, and narcotics, and by lead, it is at least very doubtful whether either of these can produce the affection in any degree. We can admit that the nervous structure of the eye may be diseased in the rheumatic and gouty, as well as in other persons; but it will require clearer evidence than we possess at present, to show that there are distinct gouty and rheumatic amauroses.

To avoid all ground of dispute, we may consider the subject under three divisions, according as the disease proceeds from affection of the sensorium, or of the optic nerve, or of the retina. I must, however, observe beforehand, that we cannot always make the distinction quite satisfactorily. The evidence during life leaves us sometimes in doubt whether the case ought to be referred to one or another of these heads.

SECTION II.—AMAUROSIS FROM AFFECTIONS OF THE BRAIN.

Temporary or permanent blindness may result from compression or severe concussion of the brain.

I have related two cases at pages 130 and 131, in one of which complete blindness, and in the other, imperfect vision in one eye, followed concussion, and were the only permanent consequences of the injuries.

In another instance of concussion the left eye remained totally blind. The injury was not particularly severe, nor attended with danger; and the sensorial functions were not impaired in any other respect. The eye and the surrounding region suffered no direct injury, and the occurrence of blindness was not noticed till the patient began to recover from the accident. The insensibility to light was complete; the pupil was partially dilated; the independent motion of the iris was lost, but it moved in harmony with that of the other eye. There was no other visible change in the organ. The patient remained under observation and treatment for some weeks; but there was no improvement of vision.

While these sheets are passing through the press, I have seen a patient who was stunned by falling down a flight of steps in the night. There was no external wound; but the right temple had come to the ground. He found himself blind with the right eye, but had no other symptom of injury of the head. When I saw him, on the fourth day after the accident, no active measures had been adopted. Both pupils were about the middle size; the iris moved very slightly in each eye, perhaps less in the right than in the left. He could not see the persons who stood round him in the room: but, in looking straight forwards, he faintly discerned an individual placed on his right side.

In the third volume of the *Glasgow Medical Journal*, at page 201, Dr. AUCHINCLOSS has reported a case of injury to the head, accompanied with complete amaurosis, in which the iris retained its mobility. "JAMES ARMOUR, aged twenty-seven, a quarrier, admitted 8th of May. The accident had happened a week previously, and was occasioned by a quantity of earth falling upon him. He remained insensible for two hours, during which, considerable hemorrhage is said to have taken place from the right ear. On recovering, he felt acute pain on the right side of the head, for which he was twice bled with marked relief. On admission, he had little or no uneasiness, and complained chiefly of giddiness when he attempted to raise his head from the pillow. He was perfectly blind of the left eye, the pupil of which, however, contracted freely on exposure to light. The sense of hearing in the right ear was much impaired. His mouth was slightly drawn to the left side, which deformity increased greatly when he spoke." The other symptoms were nearly removed in the course of a month, but the sight was not recovered.

Amaurosis occurs as a symptom of cerebral disease, either when the latter is general, and therefore includes with the rest that portion of the sensorium, with which the optic nerves are connected, or when it is partial, and so situated as to affect that part. That the amaurosis owed its origin to sensorial affection, was proved by dissection in the last of the three following cases; the point is not so clear in the first, though the circumstances lead obviously to that conclusion.

CASE I. *Imperfect amaurosis remaining after violent disorder of the head.*—In August, 1826, I saw a lady, forty-two years of age, who was still menstruating. Twelve or fourteen months previously she had been reduced to so dangerous a state by violent disorder of the head, that her medical attendant had discontinued his visits, stating that further efforts were useless, and death inevitable. The gentleman who came with her to my house, and who had been called in on this occasion, found the patient comatous, and discharging her urine and feces unconsciously. By leeches to the head and other antiphlogistic treatment, her state was improved, and she ultimately recovered, but with loss of sight in both eyes. I found the pupils of middle size, with scarcely any sensible change on variations in the quantity of light. The right was a little altered in figure, and slightly dull in colour. She could make out, one after the other, capital letters of the second size in the title-page of an octavo book. Her health was excellent. Before the illness, she had suffered much for years from headache; since her recovery she had been thrown from a gig, and freely bled and evacuated. This depletion had completely removed the pain in the head.

Case II. *Complete amaurosis, with perfect motion of the irides occurring with violent pains of the head.*—A girl of eight was brought to me by her mother totally blind. The sight had been gradually lost, with violent pains in the head, three years previously, when she had not begun to menstruate. She had been treated at the time by cupping and other corresponding measures. The pupils were rather dilated, but the appearance of the eyes was in other respects perfectly healthy; and the irides acted well. She menstruated regularly, but had still pains in the head. The latter were removed by a course of the hydrargyrus cum creta with aperients; but vision was not improved.

Case III. *Complete amaurosis produced suddenly, by sensorial congestion.*—A patient in St. Bartholomew's Hospital, about thirty years of age, with enlargement of the testicle, had been directed to rub a little mercurial liniment on the part daily, and had done this four or five times, when salivation occurred. He felt indisposed in the evening of Saturday, but went to bed without making any complaint. He awoke in the middle of the night with great pain in the head and feeling very ill. He got up, and thought that the candle, usually kept burning during the night, had gone out, for he could not see it: in fact, his sight, which had been perfect when he went to bed, was lost. The house surgeon found him with a full, strong, and frequent pulse, and bled him. He afterwards administered an emetic, which was acting when I saw him at twelve o'clock, Sunday. The pulse was still full and strong, and there was great pain in the head. The pupils were about the middle state, the irides nearly but not quite motionless, and vision so completely extinct, that when a lighted candle was held near the eyes, the patient was not sensible of its presence. I ordered repetition of bleeding, and the application of a large blister at the nape. These means were again repeated. In a week vision was restored, and in a fortnight the patient left the hospital quite well.

Case IV. *Sudden complete amaurosis from violent inflam-*[illegible] *attack of the brain and membranes.*—A patient, thirty-seven years of age, came under my care at St. Bartholomew's Hospital on the 2nd of March, 1832, on account of inflammation of the basilic vein, consequent on venesection: the affection had begun on the 29th of January. The symptoms, which were serious and alarming, subsided under active treatment; the phlebitis had completely disappeared by the 16th of March, when the circulation was tranquil, the rest sound, the tongue clean, and the appetite good. A mutton chop was ordered daily, at the urgent request of the patient, who felt very hungry, and a draught of infusion of cascarilla, with infusion of rhubarb, three times a day. He took the chop, and three draughts on the 17th, slept well, and had the bowels opened on the 18th, when he rose and dressed himself, and was found by the dresser setting by the fire. He said he felt so well, that he could not remain in bed; he complained of being very hungry, and requested that he might have wine or beer at dinner: this was immediately refused. In the course of the morning his friends came to see him, and it was strongly suspected that they had brought him wine or spirits. He could not eat the chop at dinner; but he made no complaint at that time. At six P. M. he was suddenly seized with faintness, loss of sight, and slight pain in the head. He went to bed immediately, and had some calomel and James's powder, followed by an ounce of castor oil in four hours. 19th. Restless and delirious during the whole night; the retinæ are totally insensible, so that he cannot distinguish light from darkness. The pupils are slightly dilated, but contract when a candle is held before the eyes, although he is not aware of its presence. The head is hot and painful. He is sensible, and answers questions rationally. The pulse small and quick, tongue white and rather dry; there is great thirst. (The head to be shaved and covered with cold lotion; cupping on the nape to 14 oz., a blister between the shoulders; a saline draught with antimonial wine every four hours.) 20th. Vision the same. (Twenty-four leeches to the temples; a dose of castor oil; two grains of calomel, with two of antimonial powder every four hours.) 21st. A little sleep towards the morning; vision improved, so that he can see fingers held before him, and tell the number. In the middle of the day the former symptoms returned in an aggravated degree; delirium came on with continual muttering, and the stools were passed unconsciously. (Blisters to the calves.) Death took place on the 23rd: seropurulent effusion was found in the pericardium, and purulent infiltration to a considerable extent had taken place in the muscular substance of the heart. Unequivocal evidences of vascular excitement were found throughout the encephalon; the medullary substance was partially softened in several situations. The arachnoid membrane was thickened at the basis of the brain, and yellow-coloured, apparently from purulent infiltration. These changes were particularly conspicuous about the infundibulum, and the union of the optic nerves.

Impaired vision, in a greater or less degree, is a symptom generally, if not invariably, met with in hydrocephalus both acute and chronic. The state of the retina in the former varies according to the stage of the affection. During the period of excitement, there is increased sensibility to light; strong lights are avoided, the eyes being opened only in the dusk; if the lids are separated, the cornea turns up behind the upper. When effusion occurs, dulness succeeds to the increased sensibility; the natural direction and harmony of the optic axes are lost; the patients squint and look downwards, the pupils are dilated, or exhibit oscillatory movements, without being sensible to light. In the last, or paralytic stage, when convulsions come on, succeeded by palsy, the sight is lost, the pupil highly dilated, sometimes contracted but motionless. There is generally squinting, with fixed direction of the look downwards.

Amaurosis may exist in the chronic form of hydrocephalus, as a permanent consequence of the distension of the ventricles. Mr. LANGSTAFF's museum contains some interesting pathological specimens, illustrating the mode in which the blindness is produced in these cases. The third ventricle is enlarged by the accumulated fluid, and its parietes bulge in front, so as to press on the united portion of the optic nerves.

I examined the head of a female, who died at the age of eighteen, after suffering from hydrocephalus internus for eight or nine years. The symptoms came on and increased very gradually. They first consisted of change in manners and character, inability to learn, or to attend to any subject. There were occasional attacks of pain requiring depletion. The intellectual faculties then gradually declined. She was confined to the house for the last three or four years, and to bed for about two years, totally blind. Severe paroxysms of active affection took place occasionally. The pia mater was loaded with serous fluid to an extraordinary degree, forming a loose spongy mass, under which the cerebral convolutions could not be discerned. There were about eight or nine ounces of fluid in the ventricles. The anterior part of the third ventricle was greatly enlarged, so as to cause pressure on the union of the optic nerves.

The eyes exhibit no other change than a motionless state of the iris, with dilated pupil of its natural clear black. In a boy, six or eight years old, in whom the head far exceeded its natural dimensions, and in whom all uneasiness and every symptom of active disorder had been removed, and an excellent state of health produced, by long perseverance in occasional mild antiphlogistic measures, with the use of mercury, total insensibility to light remained, with partially dilated pupils; but the irides acted naturally on exposure to light.

Partial amaurosis, with strabismus and double vision, occasionally precedes an apoplectic attack. It is frequently attended with vertigo and headache, as well as with derangement of other parts. In a gentleman of full habit and short neck, who had many years previously experienced a severe apoplectic seizure, the return of vascular excitement in the head, which had been vaguely indicated for some time by headache, sense of heaviness, lassitude, and various uneasy feelings, was at last accompanied with so much confusion of vision and giddiness, that he could not keep his eyes open.

There can be little doubt that the amaurosis, in the following case, arose from cerebral hemorrhage. A coal-weigher, fifty-five years of age, lost the use of his right eye suddenly: "Whilst attending to his business, he was suddenly seized with giddiness and slight pain in the head, with the feeling of a snap, as if something had given way. From the immediate effects of this he recovered in a few minutes, but found that he was unable to elevate the right upper eyelid; and that when he had done so with his fingers, he saw only the half of objects, and that very indistinctly. He was assisted home, where he remained quiet for two days. On looking at him, the first thing that attracted my attention, was the upper eyelid hanging down over the eyeball, so as completely to conceal it. He had no power whatever over it. On examining the eyeball it appeared perfectly sound. The pupil was very much contracted and immoveable, being as small as a pin head; did not dilate with belladonna. Stated that three years previously he had a slight paralytic shock, of which he recovered; and that he had been subject to hemorrhoids, and strongly suspects this attack to have been brought on by their getting better. Bowels were also confined."[*]

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[*] Mr. Knox, *in Glasgow Medical Journal*, vol. iii. p. 348, 349.

Amaurosis is one of the symptoms attendant on various organic diseases of the head; such as induration, softening, suppuration, tubercles, hydatids, fungus hæmatodes of the brain, aneurism of the internal carotid artery, tumours in the membranes of the brain, exostosis, caries, or various sarcomatous growths of the bones, especially when these diseases are so situated as to interfere with the optic nerves behind their junction, or with that part of the sensorium with which they are immediately in relation. These affections are accompanied with other important symptoms, which show that the malady is not confined to the nervous apparatus of vision. Among these may be enumerated vertigo, pain in the head, often of the most racking kind, either preceding and accompanying the affection, or coming on at a later period; an impaired state of other senses, or of the intellectual faculties, delirium, or sleepiness, and coma; convulsions, impaired speech, hemiplegia, or other paralytic affections. One eye only or both may be affected, according to the situation of the internal disease. Dark appearances are seen, (*scotomata*,) and objects appear confused or distorted, (*metamorphopsia*.) There is often increased sensibility to light, with luminous sparks or flashes before the eye. According to the period and character of the complaint, the pupil may be either contracted or dilated. Squinting occurs occasionally, sometimes with convulsive movements of the globe or eye-lids.

SECTION III.—AMAUROSIS FROM DISEASE OF THE OPTIC NERVE.

Fractures of the skull at the anterior part of its basis may cause pressure on one or both optic nerves, or on their union, or may otherwise injure them. They may be variously affected by disease of the bone, or of its membranous coverings in the same situation, or in the orbit. Such disease may have a venereal origin, which may be indicated by the simultaneous existence of other symptoms referable to the same cause.

A remarkable example of the latter kind is related by Mr. WILSON, in the third volume of the *Transactions of a* *society for the improvement of medical and chirurgical knowledge.*[*] In the spring of 1803, the patient had been attacked with very severe deep-seated pain in the orbit of the left eye, for which antiphlogistic means, nervous medicines, change of air, and various other remedies, were tried without any advantage. The complaint, on the contrary, became worse; "the sense of hearing in the left ear was now totally lost. The levator palpebræ muscle of the left side became paralysed, and a great degree of strabismus was produced by the rectus externus having also lost its power. The pupil of the left eye became much and constantly dilated, and the sight of that eye was lost. The right angle of his mouth was permanently drawn to the right side. An extreme hoarseness took place, and his articulation became so indistinct, that he could not be understood even by his friends. He lost the power of swallowing solids, and swallowed fluids with very great difficulty, as the attempt brought on a distressing sense of suffocation."

When Mr. WILSON saw the patient in 1806, there was hemiplegia of the right side. Violent pain continued in the left orbit: there were severe pains in the cervical vertebræ, and at the top of the shoulder. He could not raise his head from the pillow; he could scarcely sleep at all, and had no respite from excruciating pain; in short, dissolution was hourly expected. Mr. WILSON also learnt that he had had chancres and buboes two or three times before his present illness commenced, and had used mercury until they had disappeared. He further discovered enlargement of the tibia and of the cervical vertebræ, swelling of the acromion and spine of the scapula, of the os brachii near the insertion of the deltoid, and of the clavicle, which was three times its usual thickness. Deeming the disease to be venereal, Mr. WILSON immediately began the use of mercury by frictions, and placed a seton in the back of the neck. The mouth became affected in four days, and the influence was continued for eleven weeks, with rapid disappearance of the symptoms, and proportional recovery of strength and health. The enlargements of the bones were reduced, and the pains removed; the muscles of deglutition, and those of the paralysed limbs, recovered their power. The pupil of the left eye remained somewhat dilated, and the upper eye-lid could not be completely elevated. Objects and colours could be distinguished with the left eye, and even small objects when green spectacles were used, and the left eye only was open. When both eyes were used, double vision with some confusion was produced.

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[*] Art. xii. p. 115.

Amaurosis may be caused by injury of the optic nerve in penetrating wounds of the orbit, or in fractures with displacement of the orbital parietes; by pressure from orbital tumours, from exostosis, or other disease of the socket; or by stretching of the nerve in consequence of protrusion of the globe (*exophthalmia*) from accident or disease. If the protrusion is recent, the amaurosis incomplete, and the replacement of the eye can be satisfactorily effected, vision may be completely restored. (See page 132, 133.)

Atrophy of the nerve, either in the orbit, or throughout its course, has sometimes been found after death in cases of complete and incurable amaurosis.

Among the invaluable pathological treasures of Mr. Langstaff's museum, there is a specimen in spirit, consisting of the eyes, optic nerves, and part of the basis of the brain of a man who had been amaurotic for twenty-eight years before his death. The sclerotica and cornea, iris and pupil, choroid and retina are perfectly healthy, so far as an opinion can be formed of the state of such parts after long immersion in alcohol. The optic nerves, in their whole extent, from the globes backwards, are shrunk into white cords, not larger than a small crowquill. At the point of union they merely lie together without being joined, and each proceeds to its own side of the brain. Where they sweep round the crura cerebri they are gradually confused and lost. Mr. Langstaff has favoured me with the following history of the case.

Thomas Maddey died in June, 1821, at the age of sixty-four, in Cripplegate workhouse, of which he had been an inmate from December, 1806. He had been subject for many years to severe attacks of gout in the feet, knees, hands, and wrists, by which at last he had become completely crippled. All the fingers and toes were deformed by depositions of what are called chalk stones; and both knees were greatly enlarged by effusion into the joints, the swellings being firm and elastic. He had been blind twenty years when Mr. Langstaff first saw him. Previous to losing his sight, and almost ever since, he had suffered violent pain in the front of the head. He had been under the care of an oculist, who had bled him copiously, and produced salivation. The irides were dark, and completely insensible to light; the pupils greatly dilated. In other respects the organs were healthy. He continued subject in the workhouse to severe inflammatory attacks, having the character of acute rheumatism rather than of gout, particularly in the knees, and he sunk under one of these, which was attended with high fever and delirium. The examination of the head presented obvious marks of recent and considerable inflammatory disturbance in the brain and its membranes, and besides, thickening of the dura mater, with partial cartilaginous induration and ossification of the membrane, which adhered to the skull with unusual firmness, and cartilaginous and osseous thickening of the arteries at the basis of the brain. The eyes presented a perfectly normal structure. The aorta was converted into a cartilaginous and bony tube. The liver was small, indurated, and granulated. The synovial membranes, articular cartilages, and ligaments of the affected joints were extensively disorganized; but the bones were healthy.

Professor **Rostan** has detailed the fatal illness and examination after death of a woman seventy-five years old, admitted on account of blindness, into the Salpêtrière, where she had lived several years. The state of her eyes is not described. She died from softening of the brain. "The optic nerves were flattened, diminished in calibre, in a state of atrophy, of reddish appearance like a small arterial tube, and without any resemblance to the whitish cord which they ordinarily represent."*

Dr. **Monteath**, of Glasgow, who translated **Weller**'s *Manual of the Diseases of the Human Eye*, has mentioned in a note a somewhat similar case. "Mrs. ——, aged eighty-three, had been completely blind from amaurosis for thirty years before her decease in 1817. She had also been subject to irregular gout, which assumed a variety of forms, and seven months before her death she was attacked with palsy of one side. On opening the head, aqueous effusion was found below the tunica arachnoidea, and in both ventricles. One part of the cerebrum was observed to be of a pulpy texture; but these appearances were most probably connected with the recent paralytic attack, and not at all with the amaurotic. All the nerves, with the exception of the optic, had the usual appearance. On examining the membranous sheaths of these nerves, it was ascertained that their medullary matter had been completely removed, and this change had taken place even nearer to the brain than where the nerves cross each other."*

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* *Recherches sur le ramollissement du cerveau.* Seconde edition, obs. ii. p. 28—31.

Demours mentions two cases of amaurosis caused by disease of the optic nerve, in both of which the iris retained its power of motion. The first was a man forty years old, who had lost the sight of his left eye six months before death. The affection, which had come on slowly, had been attended with severe pains in the head, ascribed to his occupation, that of a porter. The eye appeared healthy, and the iris retained its complete mobility. He died of fever in the Hôtel Dieu. The eye was sound, the optic nerve partially softened. The state of the latter is thus described:—"On slitting the sheath of the nerve, I found it, in nearly half its extent, as it were in a state of suppuration, and reduced into a liquid of dirty white colour."

The other patient, thirty-six years old, had lost his sight gradually, without pain, for two months before death, which took place from chronic peripneumony. The eye-ball was perfectly sound. In the middle of the optic nerve was found a small hard tubercle, of greyish colour, about the size of a hempseed.†

In speaking of the amaurosis which arises from disease of the optic nerve, **Beer** says, that "it is developed slowly, commonly in one eye only, seldom in both. A black cloud appears before the eye, and becomes gradually thicker, while the patient experiences an annoying distortion of objects, without the smallest uneasy sensation in the eye or head; he only feels a slight sensation of pressure in the back of the orbit, as if the globe were pushed out of the socket, of which, however, there is no appearance. In the very beginning of the affection, the pupil is considerably dilated, and the pupillary margin of the perfectly motionless iris is angular at various points, so that the pupil often presents an irregular pentagon or hexagon. Gradually, but very slowly, a glaucomatous degeneration of the vitreus humor, and even of the lens occurs, forming the only kind of glaucoma that I have hitherto seen without any varicous affection of the blood-vessels of the globe. At last the eye is visibly lessened, but complete atrophy does not take place." He proceeds to observe, that the affection is caused by morbid change of the nervous structure, that he cannot explain its origin, and therefore merely details what he has met with on dissection. "The diseased alterations which I have hitherto met with, have consisted of true induration of the optic nerve, and adhesion of it to the sheath. Within the cranium, the grey and completely shrunk optic nerves, as far as to their connexion with the brain, have been without a trace of medullary matter; the thalami nervorum opticorum have had their natural appearance; the neurilema has been destitute of medulla, tough, not easily torn, and has consisted of a simple vascular membrane. On one occasion, though both eyes were perfectly blind, and had been so for the same length of time, the nerve of the left eye only and its neurilema were in this state of atrophy as far as the sella turcica, while that of the right eye was indurated and closely adherent to its sheath, without being in the least shrunk. Between the union of the two nerves and the brain, they were in a perfectly normal state. The left corpus striatum was so hard, that it required a strong and sharp scalpel to divide it, but its colour and form were natural. The plexus choroideus was wanting on this side. In three amaurotic persons of this kind, I found hydatids in the sheath of the optic nerve, the medullary substance being apparently pushed aside; and on the most careful examination, I could not discover the lenticular? ganglion, (Augennervenknoten.")[*]

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* Vol. ii. p. 79, 80, note.

† *Traité des maladies des yeux*, tom. i. p. 74—76.

SECTION IV. — AMAUROSIS FROM AFFECTION OF THE RETINA.[†]

The retina may be affected originally and exclusively, or secondarily and in conjunction with other parts of the globe.

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[*] *Lehre*, vol. ii. pp. 578, and 580, 581.

[†] In compliance with general usage, I apply to the affections considered in the present division, the name amaurosis, without any epithet to denote the particular seat of the affection. This name should be confined to the cases in which either the optic nerve or the retina is the seat of disease. In the other instances, the disease is in the brain, or in its immediate neighbourhood, and impaired sight is only one out of many symptoms.

As the characteristic symptoms are not sufficiently known in each case for us to establish clearly and satisfactorily, in every instance, the diagnosis between that amaurosis which has its source in the retina, and other forms of the affection, the following observations, although principally, are not exclusively, applicable to the former.

Under the name amaurosis cases of the first description are generally understood; and in order to prevent confusion, it would be well to confine the term to them. In the affections, which either originally or subsequently involve the nervous together with other structures, such as general inflammation of the globe (*ophthalmitis*,) inflammation of the internal tunics (*ophthalmitis interna*,) whether idiopathic, syphilitic, or arthritic; in glaucoma, in atrophy, and dropsy of the eye, in fungus hæmatodes, cancer and melanosis, blindness is ultimately produced; and, inasmuch as the retina is disorganized, the eye may be said at last to be *amaurotic*, though the diseases are properly named from other more prominent characters.

The effect of laceration and concussion of the retina, in producing blindness or injury to vision, has been already considered in speaking of wounds of the globe. (See page 136, and page 145 to 149.) The cases there detailed show that amaurosis, more or less complete, which sometimes admits of cure, sometimes not, may result from such accidents. Mr. KNOX mentions the following instances of partial injury to vision from external violence. "A central, black cloud appeared in the eye from a blow with a chip of stone, beyond which vision was perfectly distinct. There was no other apparent cause for the affection. Mydriasis, in another case, was produced from a blow on the eye with a snow-ball; blood was also mixed with the humours. In a third instance, diplopia, and confusion of vision, particularly when looking at distant objects, were occasioned by a fall, which at the time caused insensibility. Strabismus and visus dimidiatus, in a fourth case, were produced by a blow with a stone on the lower eyelid; and in a fifth case, the pupil became perpendicularly oval and dilated, and vision very much impaired, in consequence of a blow on the eye-ball with a blunt arrow." *

Mr. KNOX observes further, that "a considerable period sometimes elapses between the receipt of the injury and the occurrence of the amaurotic symptoms. In many cases those symptoms do not evince themselves until weeks or months after the receipt of the blow." In some cases, the sound eye becomes affected, sooner or later after the accident, with amaurosis, which may be called secondary or sympathetic. An example is mentioned at page 147. Mr. KNOX mentions the case of a girl, who received a blow from a potatoe on the outer canthus. Vision, though injured, was not destroyed till four weeks after the accident, when complete amaurosis occurred, and the globe afterwards became soft. About five months afterwards, the sight of the other eye failed, and was ultimately completely lost.*

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* *Glasgow Medical Journal*, vol. iii. p. 344.

Amaurosis has been sometimes ascribed to the direct pressure of a hard lens on the retina, when the operation of depression has been unskilfully executed. BEER mentions a remarkable illustration of this point. "A patient had become perfectly amaurotic immediately after the depression of a hard cataract in each eye, probably from the lens having been incautiously carried down too far, and thus having pressed on the retina. The cataracts rose again into their places, in consequence of the patient, when in a state of intoxication, having fallen on the head from a high bed. I extracted them, and thus restored sight, after eight years of blindness."†

That small simple punctures of the retina, and slight transient pressure from the displaced lens, lead to no consequences injurious to vision, is proved by the experiments of MAGENDIE, mentioned at page 47. In the operation of depression the retina is sometimes punctured without any bad effect.

The amaurosis having its origin in the eye itself, which is the most frequent and important form of the disease, arises, in most cases, from inflammation of the nervous structure, and the usual result of such disturbance, namely, organic change, which, if not removed at an early period, becomes so established as to render the part permanently incapable of executing its function. Under the term inflammation may be included all degrees of increased vascular activity, whether designated as fulness or turgescence of vessels, determination of blood, congestion, or as inflammation in its more limited sense. From the structure of the retina, we might expect that it would be liable to such affections. The minute ramifications of the arteria and vena centralis retinæ are connected together so as to form a membrane of extreme thinness, but appearing, after successful injection, to consist almost entirely of vessels: in this vascular network the nervous pulp is expanded, like a thin layer of soft jelly. This delicate organization not only participates in those causes of vascular disturbance which affect the head generally, but is exposed by the nature of its office to numerous, powerful, repeated, and long-continued impressions. Thus it may be compared to the brain, in its structure, and in the morbid influences which it experiences. When the disturbance of its capillary circulation has reached a certain height, interstitial deposition and change of structure may be expected. The retina of an amaurotic eye, dissected by LANGENBECK,[*] exhibited increased firmness of texture, with numerous blood-vessels and yellow spots. It has been found, in other cases, thickened,[†] opaque, spotted, buff-coloured, tough, and sometimes even ossified.[‡] It may be probable, as LANGENBECK [§] suggests, that the change of colour occasionally seen in the pupils of amaurotic eyes, arises from alteration in the condition of the retina consequent on inflammation; but this point is not as yet proved by dissection.

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* *Glasgow Medical Journal*, vol. iii. p. 345.

† *Lehre*, vol ii. p. 458, 459.

The retina may be affected sympathetically, as the stomach may be disordered without any change visible on dissection. In representing that the state of the retina causing amaurosis ought to be regarded as essentially inflammatory, I do not mean to assert that every alteration of its function displayed in amaurotic affections is attended with visible changes of structure: there may be a temporary impression, leaving no traces after death. On the whole, however, impaired vision bears the same relation to the retina and optic nerve, as other symptoms do to the various organs from whose disorders and diseases they proceed.

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[*] *Neue Bibliothek*, vol. i. p. 56.

[†] In an eye, dissected by MAGENDIE, the retina was converted into a white, fibrous membrane, very firm, and like an aponeurosis. On its outside, and adhering closely to it, was an osseous stratum, varying in thickness from one-fourth to three-fourths of a line. The choroid adhered to the external surface of this bony layer.—DEMOURS, *Traité des Mal. des Yeux*, tom. i. p. 73, 74.

[‡] In an account of the Ophthalmic School of Vienna, by Dr. JUENGKEN of Berlin, he mentions that it contains a collection of anatomical and pathological preparations of the eye, unique in its kind, as he supposes. Among them is a series of amaurotic and atrophic eyes, in which the retina and ciliary body are ossified. The change begins in the retina from the foramen centrale; a bony ring is formed round it at first, in the middle of which the foramen remains open, and larger than in the natural state. In some eyes nothing is seen but this ring; while in others, the ossification of the retina, which is collapsed and in folds, extends towards the circumference, and there gradually ends. In the most diseased eyes, ossification is seen in the ciliary body, as well as in the retina, the change being most considerable in the middle of each organ, and less strongly marked where they approach each other.—GRAEFE und WALTHER's *Journal*, vol. i. p. 514.

[§] "What," says he, "can afford a stronger argument that the retina undergoes a material change, than the pale dull colour of the fundus oculi so often observed in the amaurotic? If the substance of the retina becomes changed by an inflammatory process, the fine pulpy texture must be lost, it must become incapable of receiving luminous impressions, and sink to the level of organs destined to fulfil less important offices. If we look back to causes, we find in many cases that amaurosis obviously proceeds from various morbid states of constitution, (*dyscrasien,*) of which the first effect is inflammation. During the prevalence of the humoral pathology, several cases of amaurosis were supposed to result from the deposition of morbific matter. Why do not we proceed in investigating the causes of amaurosis as we do in arranging inflammations of the eye? As there are ophthalmiæ from dyscrasia or metastasis, so there may be inflammations of the retina of like nature. In very vascular organs inflammations are always more acute than in less vascular and more nervous structures: hence inflammation of the retina has a chronic rather than acute course."—*Reflexionen über die natur, ursachen und heilung des schwarzen staares*; in the *Neue chir. bibliothek*, vol. i. p. 56, 57.

The prevailing notions respecting amaurosis have been not only different, but almost opposite. It has been supposed to arise from debility. Patients commonly speak of their sight being weak, and fancy that it requires to be strengthened. The vague opinions thus expressed seem to be the only foundation for the common pathology and treatment of amaurosis. Surgeons and physicians have believed in atony or debility of the optic nerve, and have endeavoured to combat this imaginary state by strengthening treatment, by tonics and stimulants of all kinds, both local and general. As this view of the disease is totally erroneous, the treatment founded on it must be not only improper, but injurious. Let us apply, for a moment, the same notions and treatment to other cases. What would be the result if we should view diseases of the brain, lungs, or stomach, in the same light; if we should see nothing but the impaired function, and proceed immediately, without considering the state of the organs, to adopt a course of direct stimulation, in order to remove the weakness of the mind, of breathing, or digestion? The pathology of amaurosis must be founded on the same principles as that of the affections just alluded to; and the only successful treatment will consist, with a few exceptions to be noticed hereafter, in the variously modified antiphlogistic measures deduced from those principles.

Inflammation of the retina, or at least active disturbance of its capillary circulation, sometimes comes on suddenly, and proceeds rapidly to loss of vision. Although the affected texture is out of sight, the symptoms demonstrate clearly the seat and nature of the disease, and we do not hesitate in calling it *retinitis:* it might be termed *acute amaurosis.* (See CHAPTER XVIII., SECTION I., page 323 to 327.) In the great majority of instances, the disease arises gradually, and proceeds slowly, observing altogether a chronic type. The following account is a description of this affection, which might be named, in order to distinguish it from the other,—*chronic retinitis*, or *chronic amaurosis*. There is no boundary between the two forms of disease, which pass gradually into each other. A similar insensible transition connects simple retinitis, whether acute or chronic, with inflammation of the internal tunics, either idiopathic or arthritic. Indeed the latter cases differ from the former only in the extent of disease.

The leading symptoms of amaurosis consist in the variously altered state of the function. We find sight impaired in all possible ways. In various instances there are all kinds and degrees of defective perception in respect to the form, colour, and proportions of objects, and their relations to each other; augmented and diminished sensibility to light; impediments to vision most diversified in degree and kind; and perception of the most various imaginary objects and colours.

In the beginning of the affection patients complain of the sight being weak or dim; objects are seen, but imperfectly; they appear more or less obscured by cloud or haziness; the letters of a book run into each other and become confused; the eye is soon tired, and waters or becomes bloodshot if exertion is continued. Sometimes near objects are not clearly recognized, when those more distant are seen perfectly. This incipient stage, in which vision is partially impaired, is *amblyopia*, or weakness of sight: it is sometimes seen as a permanent condition.

They who divide amaurosis into two kinds, that with increased, and that with diminished sensibility of the retina, enumerate, as symptoms of the former, various kinds of impaired vision, some of which rather denote the period of excitement in disease of the retina, than the more advanced stage, ordinarily designated as amaurosis. Some of the symptoms now alluded to are merely the offspring of sympathetic disturbance caused by primary disorder in other quarters.

BEER observes, "that in some rare cases of incomplete amaurosis, the sensibility of the retina to light is so much increased, that the patient avoids all places where there is strong light, particularly where strong reflected light falls on the eye, and seeks comparative darkness; protecting the eyes, when he goes abroad, with a green shade, or with green spectacles. This state passes under the name of intolerance of light, or *photophobia*. Under such circumstances, the patient sometimes discerns for a short time, that is, for a few moments, or more rarely for a longer period, even the smallest objects in an extremely weak light, as clearly as the best eye can see them in the light of day; while, at other times, he cannot distinguish even larger things in the same light. This state, which is called *oxyopia*, (that is, *acuteness of sight*, from οξυς, sharp, and οψις, vision,) deserves the particular attention of the practical surgeon."[*]

This increased sensibility of the retina may become so considerable, that the presence of light cannot be borne; at least it causes severe pain in the eye and brow, with discharge of tears and confusion of all objects. The patient, therefore, remains in a darkened chamber, and may be said to suffer under a kind of day blindness, or *nyctalopia.* I saw a patient, in whom, although amaurosis had existed for some time, and advanced considerably, the smallest light could not be borne; and he remained constantly in a room with the very crevices of the shutters carefully stopped up. More commonly the retina is in an opposite state. Its increasing insensibility, and the consequent necessity of a powerful impression to produce any effect, lead the patient to get as much light as he can. He seeks clear and bright lights; and in attempting to read, places his back towards the window, that the light may fall on the book.

When the amblyopia, with increased sensibility, proceeds a little further, a shining glare appears before the eye, sometimes with rainbow colours, sometimes tremulous, surrounding and confusing objects. A light cloud may pass before the eye; or luminous and fiery points, flashes, or streaks, may be seen. Blue or yellow flashes, or globes of fire, are seen in the dark, or when the lids are closed. This glare of light, and these various luminous appearances, often continue when the sensibility of the retina has been completely extinguished, and lead the patient to indulge in hopes that his vision may be restored (*Visus lucidus; photopsia*, from φως, light, and οψις, sight; *Marmaryge* of HIPPOCRATES, that is, μαρμαρυγη, flashing or dazzling light)

Objects are sometimes perceived with prismatic colours or haloes round them; sometimes they appear completely altered in colour, for example, as if seen through a yellow glass (*Visus coloratus; chrupsia.*[†])

The preceding, and various other defects of sight, (*vitia visus,*) which have sometimes been enumerated, as if they were peculiar affections, or even distinct diseases, are merely forms of the impaired function, symptoms of amaurosis, that is, of disease seated in the nervous structure of the eye. One of the most frequent of these symptomatic phenomena is broken or interrupted vision, (*visus interruptus.*) The eye misses parts of objects; letters or words are lost in reading, and the patient moves the whole head to search them out. Sometimes the upper or lower half, sometimes the right or left half, is not seen: (*visus dimidiatus; hemiopsia:*) sometimes a small part only of the retina retains its sensibility, and such things only are seen as are placed in a particular direction with respect to the eye. Slight movements of the head or eye put the latter out of its proper position for vision, and it is not easily brought back again to the right place. Things sometimes appear deformed or distorted; (*visus defiguratus; metamorphopsia;*) sometimes as if enveloped in a mist or cloud, which may be light, dark, or changeable, or apparently composed of minute objects coalescing; *visus nebulosus.* This cloud becomes thicker and more extensive, until the perception of objects is destroyed. A common symptom of incipient amaurosis is the appearance of floating or moving bodies before the eye; *visus muscarum; myodesopsia.* Dark or semi-transparent threads, spots, streaks, insects, rings, chains, and indeed minute substances of every description, seem to float before the eye, moving rapidly upwards and then falling, more conspicuous and more troublesome in impeding vision in a clear light, or in looking at a white or light object. A single black speck is called *scotoma;* the more numerous moving bodies are called *muscæ volitantes.* It is not uncommon for the patient to see before the eye a black disk, which increases in size as the affection proceeds, becoming larger and larger until at last it covers the field of vision. As the moving bodies increase in number, they become more completely opaque, and unite so as to form a net or thick veil, more or less completely enveloping whatever the patient looks at (*visus reticulatus.*) This net appears dark in a clear place, or against a white ground; while in the dark it is shining, and whitish or yellowish.

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[*] *Lehre*, vol. ii. p. 426.

[†] This word, employed by BEER, (*Lehre*, vol. ii. p. 428,) seems to be compounded of χρως, or χροα, colour, and οψις, sight.

Double vision (*diplopia, visus duplicatus*) is a common circumstance in incipient amaurosis. The affected eye deviates from its proper direction, or squints, so that the optic axes do not correspond. Hence objects are seen double; the two images sometimes being equally clear, though the second is generally fainter. The two may be close together, or at some distance; and the second may be above, below, or at one side of the first. When either eye is closed, vision with the other is single. The movements of the two eyes coincide in certain directions, so that the double sight is only partial.

Squinting and double vision may be caused by sensorial affections, without amaurosis. The symptom in this form sometimes precedes apoplexy.

The very rare occurrence of double vision with one eye must be referred to affection of the retina. **Beer** calls it *diplopia nervosa*.

In some instances the commencement of amaurosis is attended with near-sightedness (*myopia*,) or far-sightedness (*presbyopia*.) The latter is the most common.

In some instances vision is enjoyed during a part only of the twenty-four hours, and the patient is blind during the other part. He may see well in the day, and be blind at night; (*cæcitas nocturna* or *hemeralopia*;) or vision may be imperfect in the day, and better at night; (*cæcitas diurna* or *nyctalopia*.)

Although the various kinds of imperfect vision, now enumerated and described, are designated by appropriate names, they are not distinct diseases, but mere variations in the state of the function originating in a common cause, namely, disease, or disorder of the retina. The pathological conditions of this texture, especially in the early and active periods of disease, are almost entirely unknown to us; and we are therefore quite unable to point out the particular circumstances in the affection which give rise to each of these modifications.

The central portion of the expansion, which is the usual seat of impression, loses its sensibility first; the circumference, which does not undergo the same degree of habitual exertion, retains its powers longer. Hence patients can frequently see objects placed laterally, particularly on the temporal side, after the power of distinguishing them in the direct line of vision is totally lost.

The origin and progress of amaurosis are very various. It may be produced suddenly, and reach its full development in a few hours. This is exemplified in the cases related at page 494, as well as in that of the patient struck with lightning, at page 325. I have seen a few instances, in which persons having gone to bed with perfect sight have been totally blind the next morning. Sometimes blindness is produced in a few days, weeks, or months, while in other instances years elapse before vision is altogether lost. In some cases the imperfection of vision reaches a certain point, and the disease is then stationary.

I was consulted by a gentleman, twenty-six years of age, who, three years previously, had gone out shooting at night, the ground being covered with snow. The next day his sight was dull, within a few days it had become very imperfect, and had continued in the same state to the time of my seeing him, in spite of various treatment. In the large print of a title page, he could just slowly make out the letters one by one. The pupils were about the middle size, and the irides possessed but little power of motion.

More commonly, and especially under neglect, with continued exposure to the causes which have induced the affection, or injudicious treatment, it ultimately ends in total blindness. In this stage there is a peculiar vacant stare, very characteristic of the affection. On entering a room, instead of looking at persons or surrounding objects, the eyes are directed forwards with the lids wide open, and are fixed in a kind of gaze on vacancy. There is a want of movement in the eyeballs and the head, and a quiescence of all the external parts whose motions ordinarily harmonize with those of the direct visual apparatus, which immediately betray the state of the case even to an inexperienced observer. This vacant stare at nothing does not occur in cataract. Although the patient may be unable to discern objects, he looks about, as if conscious that vision still exists. In short, the state of the eyes, eye-lids, and surrounding parts, with the mode of carrying and moving the head, are expressive of blindness in the one case, of sight in the other.

The surface of the organ, in some rare instances, is more or less bloodshot in amaurosis; though, in the great majority of cases, the only visible changes are those in the size and form of the pupil, and the motions of the iris, with the fixed state and peculiar expression of the eye.

The pupil and the iris of amaurotic patients exhibit various changes, some of which are so conspicuous as to attract the notice even of careless observers. The former is dilated, often considerably, even in the strongest light: sometimes it is equally contracted, and that permanently. The opening often deviates from its normal form, being oval, oblong, or angular, at different points of its circumference. It may deviate from its central situation in the iris, being most frequently displaced upwards and inwards: in such cases the margin generally presents angular irregularities.

In many cases, the clear blackness which characterises the normal state of the opening is lost, and the pupil has, instead, a dull, smoky, or cloudy discolouration of greenish, greyish, or leaden cast; sometimes it is of a yellowish green, much like that of glaucoma. The healthy retina is transparent, and the dark choroid seen through it gives the pupil its black colour. If the texture of this nervous expansion be changed by disease, corresponding alteration in the appearance of the pupil may be expected. It is difficult to account for the symptom in question, except on this supposition. **Beer** says that "the blackness of the pupil in amaurotic patients is seldom so clear as in the healthy eye of a young person. Sometimes the opening is slightly smoky, or cloudy, and we cannot always distinguish at what distance from the uvea this inconsiderable discolouration is situated, or determine whether it proceeds from change in the transparent media, in the retina or choroid. When the pupil is dark grey, or rather greenish grey, we can discover, by looking at the eye sideways, that the change must be either in the vitreus humor or behind it."* If this symptom be caused by alteration in the state of the retina, the latter is not irremediable; and consequently, the former is not of itself a sufficient ground for unfavourable prognosis.

Beer proceeds to state, that the pupil may be reddish, or really red, or yellowish white, in amaurosis; and that, in all such cases, the discolouration is obviously in the fundus of the eye and concave. I think that such appearances would denote organic disease of the eye-ball, rather than amaurosis, in the strict sense of the word. I once, however, observed a red appearance in the pupil of an amaurotic eye. **Case**:—A student at one of the universities, of sanguine complexion, light hair, and full habit, about twenty years of age, who had been reading, but not very hard, was not aware of any other cause for the complaint on which he consulted me, namely, loss of sight in the right eye. Dimness had come on two months previously, and had increased gradually, so that he could merely discern some large objects with the right eye, and he saw them best when they were placed quite to the right of the eye. The iris acted equally on both sides. I thought that I caught a glimpse of something red behind the pupil, in some movements of the eye, and therefore dilated the pupil by means of the extractum belladonnæ. A portion of blood was then distinctly seen behind the lower part of the iris. It was of arterial colour, and moved a little up and down, when the globe was moved. The dilatation of the pupil produced no alteration in the state of vision. I did not see this gentleman again.

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* *Lehre*, vol. ii. p. 436, 437.

In the following passage **Richter** states his experience respecting the change of colour in the pupil of amaurotic patients. "Colorem pupillæ oculi gutta serena affecti nigrum, sanum, omnisque vitii expertem esse, plerique uno ore affirmant. Hoc autem assertum magis adhuc quam prius erroneum esse, iterum iterumque expertus sum. Plerumque sane splendido illo puroque nigrore orba est pupilla oculi, qui amaurosi laborat; languorem in illo hebetudinemque, loco nitoris illius, quo gaudet sanus integerque oculus, quilibet in illo animadvertet. Aliquoties tam insignem pallorem pone pupillam percepi, ut, quod ingenue fateor, dubius aliquando hæserim, cataractane incipiente an amaurosi æger laboret. Facilis sane in hoc casu error est, imprimis si perfecta nondum est amaurosis, motuque adhuc pupilla, luminisque quodam sensu retina gaudet. Plures sane, quod affirmare possum, ad me pervenerunt ægri, et medicorum suasu, qui cataracta illos laborare credebant, operationem petierunt."*

A motionless state of the iris, together with dilated pupil, has usually been enumerated among the symptoms of amaurosis, as if it were a constant attendant on the complaint. There are, however, many exceptions in respect to both circumstances. The various impressions on the retina by light in its several gradations are the cause of the motions exhibited by the iris in the natural state of the eye. Hence we should expect what we usually see, namely, that the iris moves imperfectly in proportion as the sensibility of the retina is impaired, being at first sluggish, and then ceasing to move when blindness is complete. In the early stage of the affection, the iris and pupil will not deviate much from their normal condition, the fixed and dilated state of the latter not occurring till the amaurosis is complete. In some individuals, whose sight is perfect, the iris possesses but little mobility; and, occasionally, it is even motionless with unimpaired vision; on the other hand, the full power of motion sometimes exists in complete amaurosis. **Janin**† has mentioned two instances in which he noticed this circumstance. One was a boy, nine years old, who had been blind six months; the other, a female of thirty-two, who had lost her sight three years before. Both were totally blind, although the eyes were to all appearance perfectly healthy, and the irides had the full natural degree of motion. The same combination came twice under the observation of SCHMUCKER,* and had been seen still more frequently by RICHTER: "Vidi enim non raro," says the latter, "perfectissima amaurosi occæcatos, quorum pupilla mobilis erat, et ad minimum lucis attactum valde vivideque se constringebat."†

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* *Obs. chirurg.* fascic. ii. p. 65, 66.

† *Dissertation sur la mobilité de l'iris dans des yeux affectés de la plus grande cécité*; in *Mémoires et observationes anatomiques, etc. sur l'œil*, p. 425.

I have mentioned, at page 497, the case of a boy totally blind from hydrocephalus, in whom the motions of the iris were unimpaired.

CASE.—*Amaurosis of one eye with perfect motion of the iris.*—A lady of fifty-six, of spare habit, healthy appearance, temperate, and always enjoying good health, had lost the sight of the right eye fifteen months before I saw her, without pain, head-ache, or any obvious cause. She had never used her eyes imprudently in reading, needlework, or any injurious occupation. The two eyes were so completely alike, that I could not discern which was amaurotic. With the right she could merely distinguish light from darkness. The independent, as well as the associated action of the iris was perfect, and both pupils were of the same size under similar circumstances of light.

When the affection is confined to one eye, the other remaining sound, we shall not, in many cases, observe the slightest defect in the amaurotic eye, so long as both are open. But as soon as the sound eye is closed, the pupil of the other is dilated and fixed, and its margin perhaps becomes angular. In other words, the iris of the amaurotic eye moves in harmony with the other after its independent action is destroyed. In complete amaurosis of old date, accompanied with change of colour in the iris, I have sometimes seen the associated action perfect, when the strongest light, directed on the affected eye with the other closed, has caused no sensation nor change in the state of the pupil.

Cases of amaurosis differ considerably in the accompanying pain, whether of the eye or head. Sometimes the disease arises insensibly, and is developed very slowly, without any pain. Sometimes there is an uneasy feeling in the eye and neighbouring parts without pain; a sensation of fullness and an unusual weight in the globe. Sometimes the patient feels as if dust or sand were under the lids. Frequently, the impaired vision is preceded or accompanied by head-ache, giddiness, dizziness. Sometimes there are pains in the forehead, over the eyebrow, and in one side of the head: these are occasionally very severe. There may be heaviness about the eye, aggravated by motion or employment of the organ. The pain may begin with the amaurotic affection, or precede it by some considerable time. If it comes on after vision has been lost in one eye, or in both, we may conclude that the pain and the amaurosis are both caused by some other disease. This observation holds good of many cases of painful amaurosis; the pain not being caused by the latter affection. Racking pain in the brow, temple, or head, not relieved by treatment, or, if alleviated, quickly returning, and accompanied by similar pain in the eye, either constant or brought on by slight exertion, indicates the existence of disease in the orbit, skull, or brain.

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* *Vermischte chir. Schriften*, p. 13.

† *Obs. chir.* fascic. ii. p. 63.

The state of the circulation, and of the digestive organs, is very various in amaurosis: the former may be excited, with fullness and strength of pulse; it may be natural; or the pulse may be small and feeble; that is, the retinal affection may be sthenic or asthenic. Sometimes the latter are in an unhealthy state, and the disturbance of this important system is a leading feature in the affection, contributing, with other circumstances, to its origin and continuance; on other occasions there is no marked derangement of their functions.

Causes of amaurosis.—The disease may occur at all ages, and is sometimes even congenital. A fine and healthy infant, which I saw at the age of six months, was quite blind. The eyes, on cursory inspection, would have been pronounced free from defect. They were blue, like those of the mother and father. The pupil, which was of middle size and clear, was not observed to vary in its dimensions. The iris was in contact with the cornea. The mother had brought forth seven children, three of whom had been born blind in this way. I have seen other instances of congenital amaurosis, where the eyes appeared perfect. In a family of children belonging to a healthy father and mother, one of whom had blue, the other dark eyes, some were light and the others dark-eyed. The latter had all of them become successively amaurotic in their early years, without apparent cause.

"Five or six years ago," says Mr. GIBSON, "I recollect to have seen five or six children, the families of two sisters, who were all totally blind, and in an idiotic state, with cataracts accompanied by amaurosis."*

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* *Edinburgh Med. and Surg. Journal*, vol. vii. p. 398.

Dr. Monteath saw a family at Paisley, the three eldest of whom were born amaurotic. He gives the following account of one, who at the time of his examination was an interesting girl of eighteen. "Her eyes and their appendages are well shaped; the iris is of a blue colour; the pupils are of natural size, form, and colour. The size, however, does not perceptibly vary from the action of different degrees of light, at least I could not discover any motion of the iris. Her eyes have not the inanimate appearance so characteristic of amaurosis, and they have less of the irregular involuntary motions usually observed in blind people." The father and mother, and their relations, have good eyes.*

Although the disease spares no age, it is most frequent at, or after, the middle period of life, especially about the cessation of menstruation in females, and the corresponding age in the male.

The influence of peculiar hereditary formation in predisposing to amaurosis is unequivocal. I had under my care, at the London Ophthalmic Infirmary, twin sisters, whose habit of body, features, complexion, and state of health, were exactly alike, as well as the colour of the hair and eyes. They were both amaurotic at the same time, and with exactly the same symptoms.

"Amaurosis," says Beer, "is much oftener hereditary than cataract; thus we see many members of a family for more than one generation, becoming blind from this cause at a certain period of life. I know more than one family, in which this is the case; and the circumstances in one instance are curious. The females, even in the third generation, become completely and incurably amaurotic, as soon as menstruation ceases; but they who have borne children escape. The males of this unfortunate family, who, as well as the females, have very dark brown eyes, show a disposition to amaurotic amblyopia, though none have become actually blind."†

I have quoted, at page 501, from Dr. Monteath, the case of an amaurotic old lady, in whom the optic nerves were found atrophic. Dr. M. adds, that "the twin sister of this lady died in the eighty-first year of her age, and for eight or ten years before her death she also had been completely amaurotic. Though her general health was more entire than is usual at such an advanced age, she had lost completely not only her sight, but also her senses of taste, of smell, and of hearing. She could not distinguish animal from vegetable food, or one sort of fluid from another. No opportunity was obtained of inspecting the head. The only daughter of Mrs. —— (the lady mentioned at p. 501,) is at present alive, and has been totally blind from amaurosis for several years; she is at present in her fifty-sixth year. I have been consulted by the son and grandson of Mrs. ——, who have both weak eyes. The grandson, in particular, has a very distressing degree of congenital amblyopia. Any exertion of his eyes induces temporary blindness, and though he can sometimes see a minute object, at others he will walk directly against a chair or table."*

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* *Manual of the diseases of the human eye*, vol. ii. p. 82, note.

† *Lehre*, vol. ii. p. 442.

The causes which contribute more directly to the occurrence of amaurosis, are analogous in their nature and operation to those which produce disease in other textures of the eye and in other parts of the body. Excitement of the circulation by errors in diet, particularly by intemperance in drinking, and the determination of blood to the head more immediately produced by such indulgences, are circumstances of frequent and powerful operation in causing disorder and disease of the retina, as well as of other parts of the eye, and of the brain. A sedentary mode of life, and residence in bad air, seriously aggravate the injurious effect of these disturbances. The continuance of such habits through a course of years impairs the functions of the assimilative organs and nervous system, and thus induces an unhealthy state of constitution, in which amaurosis occurs perhaps more frequently than in the direct plethora caused by excess in an individual whose general powers are unbroken. In a great number of instances the immediate or exciting cause is excessive exertion of the organ, particularly its employment on minute or shining objects. In many cases the affection can be clearly traced to inordinate use of the eye, which brings on the disease without any observable influence from the remote or predisposing circumstances just alluded to. Hence it is very frequent in those who follow the various occupations requiring close attention and constant exertion of the organ, as in tailors, shoe-makers, mantua-makers, milliners, sempstresses, law-writers, compositors, engravers, painters, especially in miniature, jewellers, watch-makers, and the various workers in metal. When we consider, that in these, and many other similar cases, the eye is incessantly exerted for several hours daily, and reflect on the very delicate texture of the retina, we shall only be surprised that it should retain its powers so long unimpaired.

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* *Lib. cit.* p. 81, 82.

Limited or temporary exposure to strong light may produce amaurosis suddenly, as in a stroke of lightning, *coup de soleil*, or microscopic observations. But it is more frequently seen as the consequence of habitual exposure to less powerful lights, as in cooks, workers in metal, and in glass-houses, in soldiers or sailors when living in tropical countries, in those who pursue their employments under strong gas-light.

All circumstances favouring the production of general plethora, or determination to the head, render the occurrence of amaurosis more probable; such are the sudden suppression of accustomed discharges, the cessation of menstruation at its usual period, its interruption at an earlier age, and its non-occurrence at the time when it ought to commence. In enumerating the causes of the complaint, many writers lay great stress on the suppression of bleeding from the hemorrhoidal vessels, on that of epistaxis, perspiration, or the secretion of milk, on the rapid healing of itch, or other cutaneous eruptions, or of large ulcers of the lower extremities. Without denying the agency of these causes, which in some instances is unquestionable, I consider that they have been greatly exaggerated, both in frequency and degree. I have never seen any disease, internal or external, caused by the cure of itch, although I often see the complaint in its worst form, and see it rapidly disappear under proper treatment. I never traced an amaurotic affection to the repulsion or cure of a cutaneous disease. Some of the causes above-mentioned, by producing unnatural fulness and excitement of the circulation, might render the occurrence of amaurosis more probable in those predisposed to the disease. Thus amaurosis is one out of many effects that might proceed from such causes, the influence of which is not exerted directly on the retina, but is of a more general kind. The retinal affection, therefore, is not specific, but similar in its nature to that proceeding from other causes, and requiring analogous treatment. Proceeding on these views, I cannot but think that to establish, as BEER[*] has done, specific distinctions of amaurosis founded on the supposed cause, is erroneous in principle, and calculated to produce confusion and indecision in practice.

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[*] He has devoted separate chapters to the following forms of the complaint: namely, that from irregularity or suppression of the acute exanthemata, as scarlatina, measles, and small-pox—*Lehre*, vol. ii. p. 522; from the suppression of coryza without apparent collection of mucus in the frontal sinuses—*ibid*. p. 530; from the disappearance of impetiginous eruptions, and the healing of old

Disordered states of the abdominal viscera often have a share in producing amaurosis. Sudden or violent irritation, as by acrid ingesta, or by worms, may cause temporary blindness. Here the retinal affection is sympathetic. More frequently, disorder of the stomach and alimentary canal is one circumstance, and an important one, in the chain of events leading to that unhealthy state of constitution, in which amaurosis most frequently occurs. If the hypochondriac or gastric disorder should be strongly marked, the retinal affection will probably be ascribed to it, though I believe that there are few cases, if any, in which amaurosis can be traced to the direct and simple action of such a cause.

Syphilis has sometimes been enumerated among the causes of amaurosis; according to my experience, without sufficient reason. There is no syphilitic inflammation of the retina, like that of the iris. In the latter disorder, the inflammation, which begins in the iris, often spreads to the internal tunics generally, and the eye is sooner or later amaurotic. Thus, in describing syphilitic amblyopia and amaurosis, JUENGKEN[*] enumerates the symptoms of syphilitic iritis, or, more properly speaking, of syphilitic inflammation of the internal tunics, including change of colour in the iris, effusion of lymph, adhesions and disfiguration of the pupil, and vascular zone round the cornea. But that chronic affection beginning in, and confined to, the nervous tunic of the eye, which we generally understand by the term amaurosis, has never been produced by syphilis, in the way that iritis is, within my observation. The optic nerve may suffer by contiguity in consequence of syphilitic disease in the bones of the head. Something of this kind seems to have occurred in the case quoted at p. 499.

Amaurosis may occur in the gouty and rheumatic; but the local affection receives no peculiar character from the constitutional disposition, nor does it require peculiar treatment.

BEER[†] and JUENGKEN[‡] have given the name of arthritic amaurosis to an internal inflammation of the globe occurring

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ulcers—*ibid.* p. 556; from the suppression of coryza with accumulation of mucus and pus in the frontal sinuses—*ibid.* p. 566; from the suppression of milk in suckling women—*ibid*, p. 572.

[*] *Die Lehre von den Augenkrankheiten*, p. 803.

[†] *Lehre*, vol. ii. p. 544—555.

[‡] *Die Lehre der Augenkrankheiten*, p. 801—803.

in gouty persons, generally very slow in its progress and development, accompanied by change of colour in the iris and pupil, enlargement of the sclerotic vessels and dullness of the cornea, and ending in glaucomatous cataract, varicosity of the external vessels, and staphylomatous bulgings of the sclerotica. In these cases the retina undoubtedly suffers in common with other parts, and thus impaired sight is one of the first symptoms, while blindness often occurs at an early period of the affection. This disease may appear either in an acute or a chronic form; the first is described in CHAPTER XVIII, SECTION III, under the name of *arthritic inflammation of the internal tunics;* the second in CHAPTER XXII, under that of *glaucoma.*

At page 500 I have related the history of an amaurotic affection in a gouty individual. The narrative is the more interesting as it contains a description of the changes in the affected organ and in other parts discovered on examination after death.

I subjoin the following case to show that when amaurosis, in the more strict and proper sense, occurs in an arthritic subject, the appearances in the organ present no characteristic peculiarity.

CASE. *Amaurosis in an arthritic subject; trial of mercury without benefit.*—In the year 1828, I saw a gentleman, about thirty, affected with nearly complete amaurosis of the right eye. He had been laid up with a severe attack of rheumatic gout in the right instep, in the spring of 1820, when at college, after three months of the closest application to study previous to an examination for his degree. This was preceded by a copious running, which he supposed to be gonorrhœa, though it did not yield to cubebs, which quickly stop true gonorrhœa with him. The eyes were not affected. In the autumn of next year, being then at Venice, he had what seemed gonorrhœa, though he could not account for it. The discharge stopped by the use of cubebs, and the eyes became affected, so that he could not bear the light; he was laid up for ten days. There was no affection of the joints. He says, "I set this down at the time for gonorrhœa and nothing else, and it seemed to yield to the cubebs, which I took in quantities on the road from Venice to Rome. I think now, however, that the remedy only changed the seat of the disorder from the urethra to the eyes. This was a short attack, but the only one in which the eyes were affected. In the following four years I had three or four more attacks, all preceded by running, similar to that of gonorrhœa, though in some instances I stoutly maintained there was no gonorrhœa in the case, but in vain. Every one of these attacks was in the joints, generally in the feet or in the knees, sometimes for a time flying about the chest. From 1825 to 1828 I was entirely free, though I once or twice had gonorrhœa, which always stopped in a short time by rest, low diet, and the use of cubebs. In 1828 I was seized with rheumatic gout in the left foot, which came on in one night, so that having gone to bed well, I rose quite lame. For about three weeks previously the bowels had been disordered, and flying pains had been felt in the joints. Both feet suffered, but the left principally; the knees were also affected. This attack lasted one month, at the end of which I discontinued medicine, and went into the country, still weak in the limbs." Colchicum was freely given, with magnesia, and afterwards sulphate of quinine. Soon after this, the right eye began to be affected. The attack in the limbs commenced on the 9th of August; the patient left Dublin on the 6th of September, still continuing the sulphate of quinine, under which the pains of the limbs had ceased. The eye began to be affected on the 11th of September. There was slight inflammation of the lid, and, for two or three days slight pain in the eye-ball on turning the head. He began to perceive that sight was impaired about the 14th. He could distinguish objects only in the lower portion of the field of vision, and this portion gradually lessened, so that by the 28th nothing could be seen. He returned to Dublin on the 4th of October, when sight was gone. Eight ounces of blood were taken from the temple by cupping; a blue pill was given every night. Afterwards, electricity and sulphate of quinine were employed. When I saw this gentleman on the 24th of October, 1828, there was no useful vision with the left eye, although he could distinguish light from darkness. He saw nothing straightforwards; but he could sometimes distinguish an object, such as the hand, when held towards his right side. The associated action of the iris was perfect; but when the left eye was closed, the right pupil dilated, and continued in that state. There was no pain; and the left eye was unaffected. A mild mercurial course was recommended in consultation on this case. Five grains of blue pill were taken twice, thrice, and sometimes four times daily, until the mouth was slightly affected. Calomel with opium was then administered, so as to increase the mercurial influence; the bowels became disturbed, and the patient thought the eye worse. On the 24th of December the sight remained as at first; the health was improved. He was ordered to leave off the blue pill gradually.

The German writers, particularly BEER and BENEDICT, consider that amaurosis may be caused by various articles of food, and by many of the substances employed in medicine. They enumerate the vegetables, which have the property of dilating the pupil, viz.—belladonna, hyoscyamus, stramonium, and cherry laurel; opium, succory-coffee, bitter beers, bitter almonds; gentian, quassia, simaruba, centaureum, cynoglossum; ammoniacum and galbanum; and the various preparations of lead.[*]

In describing the influence, which the four vegetables first named exert over the iris and pupil, at pages 272 and 273, I have mentioned the confusion or interruption of sight which occur when the dilatation of the pupil is carried to its full extent. This temporary diminution of sight, which seems to depend, not on any immediate influence exerted by the vegetables in question over the retina, but on the previous dilatation of the pupil, goes off in proportion as that opening recovers its natural size; and no permanent injury to sight has been produced within my experience.

In two soldiers, who had eaten the young shoots of the hyoscyamus niger dressed with olive oil, giddiness and stupidity came on, with loss of speech and sensibility, difficult breathing, small and intermittent pulse. The pupils were excessively dilated, and the eyes so insensible that the eyelids did not wink when the cornea was touched. Vomiting was soon excited in one, and he recovered in a short time. Both were fit for duty in two days.[†] The loss of sight after poisoning by belladonna, which is sometimes so complete, that the brightest light cannot be perceived, together with extreme dilatation of the pupils, may last for two or three days; and these symptoms, in a less degree, may continue for two or three weeks; they disappear spontaneously, but slowly.

According to Dr. CHRISTISON, opium, when taken in large quantities for the purpose of self-destruction, generally causes contraction of the pupil, which is sometimes excessive.[‡] The facts observed and collected by this judicious and indefatigable inquirer, show clearly that no injury to vision is produced by this powerful drug, either in small or large doses, or when habitually taken in large quantity by opium eaters.

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[*] BEER *Lehre*, vol. ii. p. 445. He has also an express chapter "*On the amaurosis produced by the abuse of bitter substances, and such as contain carbon, in food and medicine, and by the narcotic metal, lead.*" *Ibid*, p. 499—505. BENEDICT, *Handbuch*, vol. v. p. 95—100.

[†] Dr. CHRISTISON, *Treatise on Poisons*, 2nd. Ed. p. 648.

[‡] *Ibid*, p. 620, 621. "The pupils are always, at least, sluggish in their contractions, often quite insensible; sometimes they are dilated, but much more

The roots of the wild succory *(cichorium intybus,)* roasted, have been long employed as a substitute for coffee; and when the latter was rendered extremely scarce and dear by the prohibitory regulations of Napoleon, the practice became very general, particularly in Germany. Beer[*] says that he was more than once consulted on account of weakness of sight depending entirely on the free use of this substance, and that the complaint disappeared simply by avoiding the exciting cause.

Benedict[†] states that his practice had afforded no clearly marked instance of the affection. The wild succory has been so extensively used in diet and medicine, that, if it possessed the noxious properties ascribed to it by Beer, the fact must have been long ago well known. The continued employment of the plant sufficiently proves the negative. The same observation is applicable to beer, bitter almonds and the vegetable bitters and gums above enumerated.

According to Beer, amaurosis may be brought on by the continued and incautious handling of colours and other preparations containing lead; by the application to the face and breast of colouring matters prepared from lead; and by any preparation of lead swallowed in large quantity. He says, that he had often seen amaurosis from this cause, and treated it successfully.[‡] The information on the effects of lead, collected by Dr. Christison,[§] affords no confirmation of this opinion.

Beer considers that a diminution of the dark pigment covering the choroid and uvea may explain the imperfection of sight incidental to elderly persons (*amblyopia senilis.*) It would be difficult to verify this opinion. The pupil often becomes grey or green as persons advance in years, and there can be no doubt that this change arises from diminution in the quantity of the pigment. Yet sight is perfect in such cases.

I shall speak subsequently of debility as a cause of amaurosis, and particularly of the impaired vision induced by pro-

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commonly contracted, occasionally to an extreme degree." In the case last noticed they were no bigger than a pin's head. The insensibility of the iris may probably be explained by the state of the sensorium.

[*] *Lehre*, vol. ii. p. 445.

[†] *Handbuch*, vol. v. p. 97.

[‡] *Handbuch*, vol. v. p. 501.

[§] *Lib. cit.* p. 489—494.

tracted suckling; also of the disease as caused by affection of the nerve of the fifth pair.

Diagnosis.—The distinction between amaurosis and cataract has been considered in the chapter on the latter disease: see page 397 to 400.

The retina is affected in glaucoma, as well as in amaurosis; but in the former other textures are also involved, and the presence of symptoms arising from this source, in addition to impaired vision, will afford the distinguishing marks of glaucoma. These symptoms are the deeply-seated green discolouration of the pupil, and the altered colour of the iris. If, as it sometimes happens, the pupil should be also dilated and fixed in the commencement of the affection, the distinction will be still more easy. The colour of the iris is not always changed in glaucoma; green discolouration of the pupil is sometimes seen in amaurosis, while a sluggish or motionless state of the iris and dilated pupil are common to both. Hence the distinction is difficult in some cases. It is more important in reference to prognosis than treatment; for the same means are applicable to both affections, though the chance of benefit is much less in glaucoma than in amaurosis.

The distinction between internal ophthalmia and amaurosis does not involve the nature of the disease, but its precise seat and extent. By the former we designate inflammation affecting the internal tunics generally, and therefore including the retina; when the latter alone is affected, the disease is called amaurosis. The presence or absence of the alterations caused by inflammation, whether acute or chronic, in the iris or pupil, will form a sufficient ground of distinction. When the source of disease is in the retina, the affection, in the great majority of instances, is inflammation of that structure, more or less violent. When the affection is active, its pathology is clear, and we name the disease retinitis. This active inflammation may extend to the internal tunics generally, and thus produce ophthalmitis interna. Under other circumstances, the nature of the affection is not so obvious, and instead of calling the disease chronic retinitis, after the organ affected, as we probably should do if its pathology were well understood, we name it from a symptom; and we must continue to employ the term, although it conveys no information of the seat or nature of the disease, until the morbid changes, of which the retina is susceptible, shall have been more accurately investigated.

Since the principles of treatment are the same in both instances, it is of no importance practically to draw an accurate line of distinction between the cases, in which inflammation, whether acute or chronic, is confined to the nervous structure, and those in which the internal tunics generally are involved in the inflammatory affection.

Prognosis.—This turns principally on two points; viz. the degree in which vision is impaired, and the length of time the disease has existed. It is more favourable in proportion as the injury to vision is less, and the attack more recent. If the affection be partial, and the case seen early, a complete cure may be expected. We think favourably of the event when amaurosis is evidently caused by active congestion in the head; for that cause can be removed by suitable treatment. We take a similar view of the subject when the disease approaches more or less nearly to chronic internal inflammation. Our prognosis is doubtful in the earliest cases if the insensibility of the nervous structure be complete; it is equally so in imperfect amaurosis of long standing. Violent vascular disturbance may at once produce so serious a change in the retina as to render it incapable of vision, and a less degree of congestion will have the same effect, if it be long continued. The prognosis is bad when the complaint has been preceded and accompanied by severe pains in the brow, temple, and head; by pains either not relieved by treatment, or if relieved, quickly returning; also when attended with similar pain of the eye, whether constant or brought on by slight exertion of the organ. The same observation applies to the cases attended with epileptic symptoms, paralytic affections, or great change in the pupil. Under such circumstances we may reasonably suspect the existence of organic changes in the retina, optic nerve, orbit, skull or brain.

We cannot trace an accurate line of demarcation between what is called internal ophthalmia and amaurosis: in the former the inflammation is more active and affects more parts; in the latter it is a slower affection, and confined to the retina. The bolder and more strongly marked inflammation is more easily arrested than the more chronic form. The prognosis is doubtful, and rather unfavourable than otherwise, as to the complete recovery of vision, if the affection, even in its most recent state, should have produced complete insensibility of the retina. We should speak doubtfully of the result in the case of complete insensibility to strong light, even if it had only lasted twenty-four hours. I have, however, already detailed cases in which vision was completely restored after such insensibility of several days duration, (see pages 324, 325,) and I shall subsequently bring forward other analogous instances. It is difficult to say in what number of days or weeks we should give up all hopes of recovery. In the supposed case of total insensibility, or even of a near approximation to it, there would be more ground for apprehension than hope at the end of a week, though sight is sometimes restored under these circumstances; but the lapse of a few weeks without improvement, makes the case hopeless. In a case of amaurosis related at p. 326 and 327, sight was completely restored, although the complaint had lasted several weeks, and had nearly attained the degree of complete insensibility to light. When we succeed in the earlier cases of these serious affections, the restoration of sight is often only partial, the patient remaining in a state of amblyopia or weakness of sight.

The amaurosis attendant on confirmed hydrocephalus is hopeless; congenital cases are completely so. The subject of amaurosis consequent on direct mechanical injuries, has been already considered. See p. 145 to 149.

It is important to know what is likely to happen in the opposite eye, when amaurosis has occurred in one only. The causes of this affection are not merely local, or confined within the affected organ; they will generally, if unchecked, bring on disease in both eyes. The close sympathy between the two organs must also be considered; they both suffer in most cases, even in forms of disease that cannot be traced to causes of general influence. Interesting evidence on this point is afforded by those cases of wounds in which the sight of one eye is lost: in many such instances internal inflammation, change of structure, and blindness occur subsequently in the other eye. See p. 147 to 150. Hence our prognosis must be directed to the sound as well as to the diseased eye; hence, also, without expecting to benefit the diseased organ, we institute active treatment, and follow it up steadily in many cases, for the purpose of preventing the occurrence of disease in the sound eye.

Treatment.—The object is to put a stop to vascular excitement, to prevent the permanent injury of altered structure and impaired function in a part, the peculiar delicacy of which particularly exposes it to such danger. We must, therefore, employ antiphlogistic treatment of a decided character, and follow it up with a decision and steadiness commensurate with the importance of the affected organ. Under the head of antiphlogistic treatment, must be included general and local bloodletting, more particularly the latter, as by cupping from the back of the neck or the temples, or by the application of leeches, the evacuation of the bowels by purgatives, and a restricted diet. Repose of the organ should be observed, more or less complete, according to the nature of the case; counter irritation by blisters, from which a discharge may be kept up by irritating dressings: these are the means suitable to the early stage of the affection, the period of excitement. But if this treatment be not found to remove the change which has been produced in the retina, we must have recourse to mercury, which is as decidedly beneficial in these cases, as in iritis, or general internal inflammation. The remark which I made respecting the use of mercury in those affections, applies also to the present case, namely, that its good effect mainly depends upon the promptitude with which it is employed. The alterative form is insufficient; we give it with the view of arresting inflammation in the structure, which is the very seat of vision; that structure is easily changed by the inflammatory process; our only remedy is to push the mercury in a decided manner, and if we do so, we shall put a stop to the affection. The remedy must be employed freely; in many cases it must be carried to the extent of producing ptyalism; and its use must be continued for several weeks, in order to insure all the benefit that it is capable of conferring. I have treated numerous cases of amaurosis on this plan with the most favourable results; with such benefit as I have not seen produced under any other mode of proceeding. Some may be surprised at seeing this remedy mentioned again; at finding a plan of treatment proposed for amaurosis so nearly similar to what has been advised in other very different affections. The free use of mercury has been already recommended in iritis and other internal inflammations, in common and strumous inflammation of the cornea, when proceeding to change of structure. Is it then a panacea? How does it happen that the same remedy should have the power of counteracting disease in textures so different from each other? This intended objection seems to me to constitute the strongest ground for confidence in the remedy. Although inflammatory diseases differ in their phenomena, symptoms, and results, and although these differences are often very striking in different textures, the essential nature of the diseased process is every where the same: it is unnatural exertion of the capillary vessels; and if we should have a remedy capable of checking that excitement in one part, there is every reason to suppose that it would be equally effectual in other instances. Thus we resort to abstraction of blood in the affections of organs most different from each other in structure. In the same way, if we are correct in ascribing to mercury the power of controlling certain forms and effects of inflammation, its use will be co-extensive with those forms and effects; consequently, each new example of its efficacy, instead of being inconsistent with our former evidence of its powers, affords fresh confirmation of its general efficacy.

When the antiphlogistic treatment, and a fair trial of mercury have failed, I fear that we shall not effect any further essential good by other means. We must be contented with enjoining the mode of living most conducive to general health, and take the chance of such local amendment, as the affected organ may slowly experience under gradual general improvement. Residence in pure air, frequent exercise in the open air, a plain and mild but nutritious diet, the regular use of milda perients, with the occasional employment of a more active purgative, and repose of the affected organ, form a combination of measures best calculated to invigorate the system generally, and thus, as far as circumstances will admit, to arrest local disease. The effects of counter-irritation may be advantageously tried in conjunction with such measures. Blisters may be applied behind the ears, and at the side or back of the neck, and a discharge may be kept up by the savine cerate. But I prefer a succession of blisters, applying a new one to a fresh surface every five, six, or seven days. Some persons make blistering a principal part of the treatment, using thirty, forty, or more blisters in a single case. A seton in the back of the neck is another mode of accomplishing the same object.

The treatment I have described must be graduated, according to th· violence of the attack, the constitution, age, and strength of the individual, and numerous other circumstances. We cannot lay down a mode of treatment to be pursued invariably, and without deviation, in every case. It must not be supposed that all amaurotic patients require bleeding and salivation. When we meet with the affection in the form of active inflammation of the retina, more especially in a young and vigorous individual of full habit, where there are obvious marks of local vascular congestion and constitutional excitement, our treatment cannot be too active, or too quickly followed up. Treatment almost equally active is necessary in the slower inflammation that is confined to the retina, when it occurs in robust and plethoric individuals, though it should not be attended with constitutional excitement; indeed, the indication for loss of blood, whether general or local, is not to be drawn from the state of the system, but from that of the part. The condition of the retina, as indicated by the degree of vision and other local circumstances, is the principal guide. If general fulness or excitement exists, it is an additional reason for abstracting blood, and for taking it freely from the system. Mercury may be more slowly introduced in the cases of chronic character.

Amaurosis often comes on slowly and insidiously in persons of enfeebled constitution. The organ suffers from habitual excessive exertion, at the same time that the general powers are depressed by residence in confined dwellings, bad air, sedentary occupations, unwholesome diet, costiveness, and the other injurious influences of such causes. In a thin, pallid, and feeble woman, who had destroyed her health by close confinement to needlework, and whose eyes were beginning to fail, the same active measures would by no means be admissible as in the former case. To think of bleeding and salivating such a patient would be perfect madness; we should, in such a case, empty the alimentary canal, perhaps take a little blood by cupping, or by leeches to the temples, and then use mercury in the alterative manner, together with mild aperients. A few grains of PLUMMER's pill might be given every night, or every second night, and the bowels might be kept open by electuary, castor oil, or rhubarb and magnesia, taken occasionally. The blue pill may be taken in combination with aloes, or the compound extract of colocynth. It may be necessary to persevere with the mercury, slowly increasing the dose until a slight influence is visible in the mouth. A nutritious diet, without stimuli, good air and exercise, and repose of the affected organ, are important auxiliaries; and a succession of moderate-sized blisters may be advantageously combined with these means. Thus while the same principles regulate our treatment, it is modified in degree according to the violence of the symptoms and the patient's strength. In the latter description of cases, after mild antiphlogistic means, and clearing the alimentary canal, it may be expedient to combine tonics with aperients, as rhubarb with bark, calumba, or cascarilla; and to allow a nutritious diet with a little porter and wine.

I subjoin a few cases, in order to illustrate practically the principles of treatment just explained.

CASE I. *Complete amaurosis, with congestion in the head, in a plethoric subject; perfect recovery*—A young woman, twenty years of age, came to the London Ophthalmic Infirmary, then in Charter-house Square, labouring under active congestion about the head; her countenance was peculiarly florid; all the veins were obviously turgid, and she had considerable pain. Before I saw her, she had experienced severe external inflammation of one eye, which had produced a large leucomatous opacity of the cornea: the latter was in the state of incipient staphyloma. These serious changes, and the consequent loss of an eye in a young female of considerable beauty, were the obvious results of inactive treatment. She still suffered occasional relapses of inflammation in the eye; and at these times she experienced so much sympathetic affection of the opposite eye, that she could not use it without pain. Hence she readily submitted to the removal of the staphylomatous projection. which quickly and effectually relieved the sound eye. Within a month she came again, saying that she had lost the sight of the other eye. On examining it, I found that she had an attack of almost complete amaurosis; although it had existed only two or three days, she could hardly distinguish the window. She had a dilated pupil and nearly motionless iris; there was no external redness, but she had, in addition to her usual florid colour, a flushed countenance, considerable pain in the head, and some febrile disturbance of the system. Knowing from experience how prone she was to inflammatory attacks in the eye, I had her bled largely, and cupped from the back of the neck, placed her upon low diet, and gave purgative medicines; but, although this plan of treatment was followed up vigorously, no improvement of vision ensued; the retina indeed became quite insensible. Mercury was now used actively; as soon as it caused salivation the affection began to give way, and she recovered her sight perfectly. She was still liable to returns of congestion about the head, and repeatedly lost blood by venesection and cupping; she continued to employ mercury and aperients, and ultimately had a seton in the back of the neck. In spite of such means, continued and repeated for more than a year, during which time she was often bled and cupped, and took an immense quantity of mercury and purgatives, she still retained her beautiful colour and the florid red of a person from the country. She attended the infirmary nearly a year and a half, undergoing the treatment above described, more or less actively, during the whole time. I saw her two years afterwards, the eye remaining perfectly well; but, although she had still much colour, the characters of youth and beauty were in a great measure lost.

CASE II. *Imperfect amaurosis with plethora, before menstruation had begun.*—Another young woman came to the Infirmary with impaired vision; her countenance was red and flushed, and she complained of considerable pain in the head; there was evident congestion about this part. She was about fifteen years of age; menstruation had not commenced, and the consequence was a plethoric condition of the system. She was bled two or three times, purged actively, and continued this plan of treatment for two or three weeks before the retina was relieved, when the menses appeared, and she completely recovered.

CASE III. *Imperfect amaurosis with congestion in the head; antiphlogistic and mercurial treatment; recovery.*—I was consulted, in January, 1829, by Mr. M., a linen and woollen draper, of florid complexion, with much colour in the face. He was rather lusty, but stated that he had been originally spare. He was accustomed to much exercise in the open air, and said that he did not live freely. On more minute inquiry, I found that he ate heartily of animal food, and drank daily a quart of table ale, and a glass or two of spirit and water. Two years previously he had experienced a severe attack in the head, attended with slight paralytic symptoms. He was then twice bled, and cupped: he underwent other treatment, and was laid up for five months; but the sight was not then affected. On the 25th of December, 1828, he felt heaviness and dulness in the head, and was altogether unwell; but he took no medicine, and followed his usual occupations. On the 1st of January, 1829, the sight became dim, and the eyes would not bear employment. When he came to me on the 2nd, the appearance of the eyes was natural; the iris acted on both sides, not very briskly, but as well as in many persons with healthy eyes. There was no pain in the eyes, nor in the head. With the left eye he could not see even large print; with the right he could distinguish small print: but if he used the eyes for a minute or two, as in reading, writing, or examining patterns, the sight became confused, and he could not go on; words and lines ran together, the stripes of a pattern became broken and mixed. The appetite was good, the tongue clean, the bowels regular, the pulse of moderate strength, and not accelerated. (To lose twenty ounces of blood by venesection; a dose of calomel and jalap immediately, and a purgative draught the next morning; to discontinue fermented liquors and solid animal food.) 3rd. Cupping in the nape to twenty ounces; afterwards, two grains of calomel and one-fourth of a grain of opium every six hours. 5th. Not worse, nor sensibly better. 7th. The head had been very uncomfortable yesterday, when the purgative draught was repeated with complete relief. To-day, the mouth is considerably affected, and the sight much improved; he can read ordinary print with the left eye, and he can employ the eyes without experiencing confusion of vision. 9th. Mouth very sore; breath fetid. Sight perfect. The irides act naturally, and he sees equally well with both eyes. (To continue the mercury.) 13th. He has taken two pills daily, for the last three days, and is freely salivated. He went on a little longer with one pill daily; and in about three weeks the mercurial effect had gone off.

CASE IV. *Amaurosis nearly complete; antiphlogistic and mercurial treatment; recovery.*—SARAH RAYMOND, seven years old, with florid colour and blue eyes, was brought to the London Ophthalmic Infirmary, in December, 1825. On first view she appeared healthy; but, after closer inspection, she might have been considered rather too fleshy; the colour of the countenance was rather excessive. She had become blind of the right eye, without any marked pain or complaint, and without obvious cause of any kind. The right eye was almost completely amaurotic; the left unaffected. 1st Dec. Four leeches to each temple; a dose of calomel and jalap every second day. 8th. Five grains of hydrarg. c. creta night and morning; a dose of rhubarb occasionally. 15th. Vision completely restored; medicines continued. 22nd. The powder to be taken every night, and the aperient every second day. As she continued perfectly well, on her next attendance, after a few days, she was discharged, with instructions to her friends respecting the mode of living.

CASE V. *Amaurosis of both eyes, complete in one, imperfect in the other; antiphlogistic and mercurial treatment; recovery.*—About the same time, another instance of amaurosis occurred at the infirmary, in a girl about fourteen. She had lost the sight of the right eye, and sight was beginning to fail in the left. The duration of the affection on the right side was not known; it had not been noticed until the sight became impaired in the left eye. There had been no pain of the eyes or head; and I could ascertain no other circumstance calculated to throw light on the origin and nature of the affection, than that the appetite had been good, and animal food had been taken freely. There was an appearance of fulness, with some flushing of the face, and a dull, heavy look. The parent, who accompanied this girl, applied on account of the left eye, considering the condition of the right hopeless. The treatment consisted in the abstraction of blood by cupping and leeches, aperients, the administration of mercury, (*hydrargyrus cum creta*,) and abstinence from animal food and fermented liquors. In about a month vision was completely restored in both eyes.

CASE VI. *Amaurosis, with visus dimidiatus in the first instance; use of mercury to ptyalism; complete recovery.*— A gentleman, thirty-eight years of age, of middle stature, moderate in his way of living, and constantly enjoying good health, came to me on the 14th of August, 1826, on account of impaired vision in the left eye. He had usually been employed from nine to twelve hours daily in his profession, that of an engraver; and he had been working very hard for several weeks on an important plate. He said that he chiefly used his right eye. The vision of the left had been imperfect for a few days. He could see the upper part of an object perfectly, with sharp outlines, as usual, but the lower part was confused. In looking at the title page of a book, or a word in capital letters, the lower half of the leaf and the letter were not seen with any clearness. He could not read an ordinary print with the left eye, and could only make out small capitals one by one, and with difficulty. He had experienced some uneasiness; a kind of throbbing over the brow, and a weight of the upper lid, as if he could not elevate it so easily as the lower. There had been no general head-ache. There was no perceptible difference between the two eyes, nor any change in the pupil, the iris, or its motions. By the advice of his usual medical attendant, he had been cupped and taken aperient medicine the day before. (To lose sixteen ounces of blood by cupping on the nape; aperient pills daily; to abstain from fermented liquors, and take animal food sparingly, and not to employ the eye.) This patient did not visit me again till the 21st, when the pain was removed, but the sight had become worse. He now saw the entire object imperfectly, and could not distinguish the capital letters in a title-page. (Ten ounces of blood from the left temple by cupping: two grains of calomel, with one-third of a grain of opium, every six hours.) 31st. Mouth not affected, sight rather worse.

(To rub in ung. hydr. fort. ʒj. every night, and to continue the calomel and opium.) 24th Sept. The mouth has been sore for three weeks, and is now severely affected, with great irritation of the bowels and constitutional disturbance. Vision is greatly improved. (To keep up the mercurial influence by means of blue pill.) 10th Oct. The mercurial effect has been maintained in a slighter, but still decided degree. Health is recovered. Vision is perfect, but exercise of the eye brings on uneasiness. 24th. He can read the smallest print, but the eyes do not yet bear exercise. (To leave off mercury; to go to the country, for change of air; and to return slowly to use of the eye.) In a few weeks this gentleman had completely recovered. In 1829, I learned from his brother that there had been no relapse; that vision continued perfect, and that the patient followed his occupation of engraving regularly as he had done before.

In the preceding case, the patient saw only the upper half of objects with the affected eye. In another instance, which came under my observation in the autumn of 1830, where there was incipient amaurosis of one eye, the patient saw only the left half of objects; thus in the word Clinique, he saw only the three first letters.

Case VII. *Imperfect amaurosis of four weeks duration; treatment by depletion and mercury; recovery.*—In the summer of 1830, I saw the captain of a merchant vessel, between fifty and sixty years of age, who had lived freely. He had enjoyed but little sight with the right eye since he had the small-pox; but the cornea, iris, and pupil were natural. In coming home from the Mediterranean, the sight of the left eye failed. When I saw him, four weeks after the attack, he could not distinguish even capital letters. The pupil was in the middle state; the iris acted equally well in both eyes. He had been bled and purged. I ordered mercury. The mouth became sore, but was not considerably affected; it remained so for five weeks, when I saw him again. He could now read ordinary print. I recommended that the mercurial influence should be carried further, and kept up for some weeks.

Case VIII. *Imperfect amaurosis, with partial double vision; antiphlogistic and mercurial treatment; recovery.*—James Bailey, fifty-five years of age, a tall, muscular man, with light complexion and eyes, applied at the London Ophthalmic Infirmary in 1826, with imperfect amaurosis of both eyes: he saw double in some directions. He could make out capital letters, a third of an inch in height; but he could not read even a large, ordinary print. Severe head-ache had preceded and accompanied the failure of vision. The motion of the irides was hardly impaired. The pulse natural. Jan. 5th. (Venesection to twenty ounces: a dose of calomel and jalap immediately, and afterwards five grains of blue pill three times a day. To abstain from animal food and fermented liquors.) 7th. Vision improved. (Cupping on the nape to sixteen ounces; the pills continued.) 10th. The mouth is sore; the double vision and headache are gone; he can read middle-sized print. (The pills continued.) 17th. Sight quite recovered. (Five grains of blue pill every night, and an occasional aperient.) 28th. Quite well; recommended to continue the remedies for a fortnight.

CASE IX. *Amaurosis nearly complete; mercurial treatment; recovery.*—MRS. G., forty-four years of age, of fair complexion and blue eyes, who had ceased to menstruate two years, consulted me for an affection of the eyes, on the 27th of July, 1831. Her eyes had been bad eight years before, while she was suckling. The disease began a month after delivery: there was some external redness, and the sight was so bad, that she could not see to read or work for some months. This gradually went off, and sight was completely restored. She had been confined to the house for three weeks before I saw her with an attack of influenza, in which the bronchial membrane had been principally affected. The illness had not been considerable. Leeches had been once applied to the chest; she had felt weak, and the tongue had been foul. She had felt some imperfection of sight, but had been able to read. On the 24th vision had become rapidly worse. Six leeches had been applied to the temple, on the 26th, without any benefit. When I saw Mrs. G. on the morning of the 27th, the appearance of the eyes was nearly natural; the irides were rather sluggish, and the pupils slightly dilated. With the right eye she could distinguish nothing; with the left she could difficultly discern a large object, such as a person, but without being able to determine what it was. There was no pain in the eyes, and she said that she felt none in the head; but it appeared, on close examination, that there was some unusual sensation about the right temple. She felt weak; the pulse was a little accelerated, but not full nor strong. The tongue is foul. (Cupping on the nape to fourteen ounces; an aperient draught; then two grains of calomel with one-third of a grain of opium every six hours.) 11th August. The calomel and opium have been continued to this time, without affecting the mouth further than to produce an unpleasant taste in the morning. The bowels have not been disturbed; indeed they have required the occasional use of aperients. The tongue has become cleaner; the health and spirits are improved. There has been a regularly progressive amendment of vision; and Mrs. G. was this day able to read the print of an ordinary octavo. The eyes, however, are fatigued even by a short trial, and light is rather offensive. 16th. The bowels had been irregular and rather confined, and an attack of purging, with considerable pain, took place on the 14th. Chalk mixture with tinct. opii was ordered by Mrs. G.'s usual medical attendant. She felt very ill, and the sight was much worse on the 15th, the nervous structure of the eye probably partaking of the depression under which the system generally was labouring. Last night she slept well, and she is much better to-day; the sight not only having recovered, but improved. She can now read a small print. (To omit the pills for twenty-four hours; then to take five grains of hydrarg c. creta three times a day.) 20th. A return of pain in the lower part of the abdomen took place, with purging: there was a sensation as if the bowels were imperfectly relieved, and that there was still something to come away. Purgatives were ineffectual. On examining the rectum, it was found blocked up with hardened feces, which it was necessary to remove with the finger and instruments. Very copious evacuations then ensued, with complete relief of the intestinal symptoms. Mrs. G. continued the hydrarg c. creta for ten days or a fortnight, the power of vision having been previously completely restored. The eyes, however, remained unnaturally sensitive to light, so that the protection of a shade or coloured glasses was necessary when she went out; and employment of them in reading, writing, or needlework, could not be borne for more than a few minutes without bringing on confusion of vision and pain. Mrs. G. now went into the country to recruit her health. The power of continued exertion has returned but slowly; and Mrs. G cannot now (December, 1832,) exert the eyes for more than two hours at a time. She can discern the minutest objects as well as ever.

CASE X. *Impaired vision, with presbyopia; mild antiphlogistic and mercurial treatment; recovery.*—Late in the spring of 1827, a young lady had a severe inflammation of the fauces, attended with loss of voice, for which she was confined to bed nearly a fortnight, and employed depletion to the extent of weakening her considerably. "During this illness," she says, "the light was very distressing to my eyes; but when a little recovered, they appeared quite uninjured, and I was able to read, &c. as usual: till one day, my strength being a little restored, I was induced to walk a few paces in the open air, but quickly returned into the house, being sensible of pain from the glare of sunshine, and also finding my eyes water from the influence, as I supposed, of a keen east wind. Whether the light or the wind had anything to do with the disorder that ensued, I do not pretend to determine, only stating the fact, that the suffusion of water in the eyes continued for two or three days, during which time I gradually experienced more and more difficulty in reading, &c. For a time I could read a good print at the distance of eighteen or twenty inches; afterwards, at the distance of a yard; whilst, on holding the book nearer, the letters were quite confused; but in a few days I lost even this power, and could no longer clearly discern small objects in any part of the room: a white thread would appear double, and one fly on the ceiling would seem to be two. The indistinctness of objects to my sight resembled that which we experience when looking through a lens at a wrong focus, with this difference, that whilst perpendicular and curved lines were indistinct, horizontal ones were distinguished as clearly as before. Though I had not then completed my twenty-third year, I had all the symptoms of that decay of sight which accompanies old age, and found the defect supplied by convex glasses; but as the use of these was followed by unpleasant sensations, and as I had occasionally some pain above the eye-brow, with a weakness, which made it difficult to fix the eye steadily on any object, it was judged expedient that some remedies should be tried in preference to having recourse to the use of artificial aids to the sight. Bleeding with leeches under the eyes, and some other means, were tried ineffectually."

When I saw this lady on the 1st of June, I found, that after the inflammation of the throat had been removed, she had begun to live more freely, in order to restore her strength; but yet had proceeded cautiously. Soon after, slight uneasiness was felt about the forehead, and some imperfection of sight was noticed. In consequence of the menstrual discharge having failed, steel was given, with some benefit, in respect to the intended object; but the sight became rather worse. At this time there was a little pain across the lower part of the forehead, only mentioned on close questioning; a little flushing of countenance. The left iris is rather sluggish. A luminous circle appears before this eye, on using it. There is general debility. It appeared to me that the impaired vision depended, in this case, on an affection of the retina of inflammatory character, caused in a debilitated individual by slight stimuli, which would not have affected one of ordinary health and strength. The treatment recommended was, leeches to the temples, mild aperients, five grains of the hydrarg c. creta twice or thrice daily, simple and unirritating, but not low diet, gentle exercise, and taking the air in an open carriage. 19th. The mercury soon produced gentle salivation, and has agreed well: the symptoms are decidedly improved. 26th. The gums continue sore; objects can now be seen at various distances nearly as well as ever; but the eye is soon fatigued. In the following statement, dated January, 1828, the intelligent patient describes the progress of her recovery.

"Some improvement was observed as soon as the soreness of the gums came on; but it was not till the means had been persevered in for several days, that any further benefit was perceptible. The power of distinguishing objects at various distances returned by degrees, together with the increase of distinctness in their outline. I was greatly surprised one day, on taking up a book, to find, that instead of the perpendicular lines being doubled, as I had before uniformly observed to be the case, it was the horizontal which then exhibited this curious variation; but very soon after this, the power of distinct vision was restored, and I once more beheld every object, whether near or distant, clearly. It was thought best to continue the use of the mercury for some time longer; and even after discontinuing the medicine, I was advised to abstain for some months from every employment which required much exertion of sight; indeed the weakness of my eyes rendered this caution necessary, as well as that of avoiding the glare of sunshine and lamp-light, both of which gave me pain. Six months have now elapsed, and I am thankful to state, that I have been able to perceive a slow, but steady increase of the power of sight, which has kept pace with the restoration of my general health and strength."

Although the preceding cases exhibit, in a striking point of view, the power of mercury in controlling that disturbance of the retinal circulation, which causes amaurosis, it must not be inferred that all cases will yield to the remedy. The prognosis seems to me particularly unfavourable, when the pupils are contracted, as will be apparent from the following instances.

CASE. *Amaurosis with contracted pupil; mercury employed without benefit.*—In the summer of 1826 I saw a gentleman who had lost the sight of his left eye in the East Indies two years before. No effectual treatment had been adopted. When he reached England, he consulted a gentleman, who made light of the complaint, said that it would do well, and advised him to live as usual, and take four or six glasses of wine daily. When I saw this gentleman in May, the sight of the left eye was gone; the right was still perfect. Both pupils were rather contracted, and equally so, not quite circular, but of natural colour. The irides moved but very slightly. He had not experienced much pain in the eyes or head. The countenance was rather flushed, the tongue foul, and the breath offensive. It appeared, on close examination, that although sight was still perfect with the right eye, the use of it brought on pain. I recommended cupping, mercurial alteratives and aperients, and regulated diet, which were adopted with some benefit. After a consultation held on the case with Dr. FARRE, a mercurial course was tried without any benefit. Indeed, at the end of it, there was more pain in both eyes, especially after using the right; the sclerotic vessels were distended in both. When these symptoms had been removed by cupping and blistering, I recommended removal to a pure air, exercise in the open air, quiet and regular living, mild and simple diet, with regulation of the bowels.

CASE. *Amaurosis with contracted pupils; not benefited by mercury.*—A gentleman about thirty, rather tall and thin, who had been occupied for many years in the counting-house, and had lived freely, gradually lost, first one, and then the other eye. I saw him a few times at distant periods, but he did not follow any plan regularly. When he was nearly blind with the second eye, he thought more seriously of the matter, and consulted Dr. FARRE with myself. Both eyes were amaurotic; the pupils contracted and motionless. Mercury was tried for twelve weeks without any benefit.

Local applications—These have been frequently employed in amaurotic cases; but what good can we expect from such means in the affections of a part so deeply seated as the retina? They have generally been of a stimulating kind, and have been used on the erroneous notion of the affection depending on weakness, of its originating in a debilitated state of the optic nerve. Spirits of wine and ether have been applied round the orbit and on the forehead; and when there is congestion and increased heat, the evaporation may have produced some benefit. Luckily these applications cannot accomplish the purpose for which they have been generally recommended, that is, stimulating the optic nerve. It is necessary, sometimes, to employ local measures to satisfy patients, who often feel, or fancy that they feel, better after them. We may prescribe, as an embrocation for the forehead, rose water, with some rectified spirits or spirit of rosemary; Hungary water, or Eau de Cologne. Ammoniacal vapours have been applied to the eye itself; and the stimulus to the conjunctiva might possibly relieve the retina. It has been recommended to wash the head every morning with cold water; this is often attended with pleasurable feelings to the patient, and it is a practice which cannot do harm under proper discrimination.

In the foregoing remarks, I have represented that form of amaurosis, which has its origin in the retina, as a symptom, in the majority of instances, of inflammatory affection, or, at least, of disturbed circulation in the nervous structure; and, consequently, requiring treatment analogous to that pursued in the management of other inflammations. Whether the correctness of the pathological view be admitted or not, the practical deduction will, I am sure, be justified by experience. The treatment I have recommended is nearly opposite to what has been heretofore advised and relied on. I must therefore advert shortly to some of the ordinary modes of proceeding.

EMETICS.—SCHMUCKER,[*] RICHTER,[†] and SCARPA have placed great confidence in medicines of this class, followed by what they call resolvent remedies; using them, not merely where decided symptoms of disordered stomach might lead to the conclusion that the amaurotic affection was caused sympathetically by disturbance in the alimentary canal, but very generally in cases of imperfect amaurosis. **Scarpa** says that "by an attentive examination of the nature and causes of the *imperfect amaurosis* which admits of a cure, it is found, from the careful observations of **Schmucker** and **Richter**, that this disease is most frequently derived from a morbid excitement or irritation in the digestive organs, from sordes, or from worms, especially in children, either alone, or accompanied with general nervous debility, in which the eyes participate sympathetically. Agreeably to these principles, in the greater number of cases of *recent imperfect amaurosis*, the principal indication of cure which the surgeon ought to fulfil in the treatment of this disease, is that of unloading the stomach and primæ viæ of the crudities, worms, or morbific stimuli; and afterwards, of strengthening the gastric system, facilitating the digestion, and at the same time exciting the whole nervous system, and particularly that of the eyes, which are affected and rendered torpid by a sympathetic connexion."*

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[*] In his *Chirurgische Wahrnehmungen*, first theil, SCHMUCKER states that he had often seen soldiers become suddenly blind on forced marches, particularly in hot weather, and when they had much to carry. A venesection immediately, and the day after three grains of the tartrite of antimony, generally restored the sight. If recovery did not take place, the jugular vein was opened, the antimony repeated on the following day, and a blister applied: these means were usually successful. The commencement of the second volume of his *Vermischte Chirurgische Schriften* is devoted to amaurosis, in certain cases of which he recommends the tartrite of antimony, given in such doses as to excite nausea, but not vomiting. He had often experienced the best effects from his pills, which are mentioned further on.

[†] In the fourth volume of the *Commentarii Soc. Reg. Scient. Goetting.* RICHTER says, that in a patient, who had become blind after being in a violent passion, he restored sight by an emetic, administered on the following day. In his *Anfangsgründe der Wundarzneykunst*, he recommends emetics and purgatives, with other resolvent medicines, in the cases where there is reason to suspect the existence of acrimonious matters in the primæ viæ; vol. iii. § 448. He also advises this mode of proceeding, on merely empirical grounds, when the cause of the affection is not discovered; and we are consequently unable to pursue a rational plan of treatment.—*Ibid.* § 454.

"With respect to the first part of the treatment of the *imperfect amaurosis*, the intention is perfectly answered by emetics and internal resolvents (*antiphlogistic purgatives.*) In the class of emetics, experience has taught that the *antimonium tartarizatum* is preferable to every other, and that when given afterwards, in small and divided doses, it answers the purpose of a resolvent medicine, the action of which may be increased by conjoining it with gummy or saponaceous substances. In the treatment of the *imperfect amaurosis*, therefore, which is most frequently sympathetic, and depending on acrid matters in the primæ viæ, it will be proper at first, in the greater number of cases, to dissolve, for an adult, three grains of tartarized antimony in four ounces of water, of which two table-spoonfuls may be taken every half-hour, until it produces nausea, and afterwards abundant vomiting. On the following day he should be ordered to take the resolvent powders, composed of one ounce of the crystals of tartar, and one grain of the tartarized antimony, divided into six equal parts, of which the patient should take one in the morning, another four hours afterwards, and the third in the evening, during eight or ten successive days. This medicine will produce a slight nausea, and some evacuations of the bowels more than usual, and perhaps, after some days, even vomiting. But if, during the use of this opening powder, the patient make ineffectual efforts to vomit, and complain of a bitter taste and want of appetite, without any amendment of the sight, the emetic should be repeated, and even a third and fourth time, if the presence of the morbific stimuli in the stomach, bitter taste, tension of the hypochondria, acid eructations, and tendency to vomit, require it. For it not unfrequently happens, that the patient, on the first action of the remedy, throws up only water, with a little mucus; but, on repeating the emetic, after the nauseating powder has been used for some days, a considerable quantity of yellowish green matter will be thrown up, which will greatly relieve the stomach, head, and eyes."* When the disease is caused in children by worms, SCARPA recommends the *coralline of Corsica*, (*mousse de Corse, fucus helminthocorton;*) or, when that cannot be procured, the semen santonici (quære, *artemisia santonicum?*)† When the stomach has been cleared, he advises the pills of SCHMUCKER, or those of RICHTER, of which the following are the formulæ. For the former; R. gum. sagapen. galbani, saponis veneti, aa. ʒj; rhei. opt. ʒj ſs.; antimon. tart. gr. xvj.; succi liquirit. ʒj. m. The mass should be divided into pills of one grain, and fifteen should be taken morning and evening for four or six weeks. For the latter; R. gum ammoniac, assafœtida, saponis veneti, radicis valerianæ, summitatum arnicæ, aa. ʒij; antimon. tart. gr. xviij misce. To be divided into pills of two grains each: fifteen to be taken three times a day for some weeks.‡

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* *Treatise*, &c. p. 458.

"The phenomena," says SCARPA, "which are usually observed to happen in consequence of this treatment, are the following:—the patient, after having vomited copiously, feels more easy and comfortable than before. Sometimes, on the same day on which he has taken the emetic, he begins to distinguish the surrounding objects; at other times this advantage is not obtained till the fifth, the seventh, or the tenth day; and in some cases not till some weeks after the administration of the emetic, and the uninterrupted use of the opening powders and pills. As soon as the patient begins to recover his sight, the pupil is found less dilated than before, and also contracts more when exposed to the vivid light of a candle;

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* *Treatise*, &c. p. 459, 460. † *Ibid.* p. 460, 461. ‡ *Ibid.* p. 461, 462.

and in proportion as the power of vision augments, this contraction and mobility of the pupil increases. Upon the whole, the cure is seldom completed in less than a month, during which time the use of local remedies calculated to excite the torpid action of the nerves of the eye should not be neglected."[*] For the latter purpose, SCARPA recommends the vapour of the liquor ammoniæ. The eye may be exposed, for half an hour at a time, three or four times in the day, to the penetrating vapour arising from this fluid in a small vessel, as near to the organ as can be borne conveniently.

When the stomach has been cleared, and the patient has in a great measure regained his sight, SCARPA endeavours to strengthen the stomach, and invigorate the nervous system: An ounce of powdered cinchona, and half an ounce of valerian root should be divided into six powders, of which one may be taken night and morning for at least five weeks. During this time, exercise in a good air, and tender juicy food, with a moderate quantity of wine, are recommended.[†]

The respect justly due to the names of RICHTER and SCARPA would naturally lead us to try a mode of treatment which they have so strongly recommended. I have accordingly employed their plan in some instances which appeared favourable, but entirely without success. I have seen no case of amaurosis cured, nor even relieved, by such measures. On the contrary, after the ineffectual trial of emetics and nauseants, I have removed the disease by the abstraction of blood and the other treatment already described. I have therefore entirely abandoned the use of emetics in amaurosis. I should not consider them safe, if general plethora, determination to the head, or active disturbance of the retinal circulation were present. As the full trial of the plan would require several weeks, we must also consider the loss of time that it involves. If the disease does not yield to our treatment, it will advance; and, from being imperfect and curable, it may become, in a few weeks, complete and incapable of cure.

Electricity has been frequently employed in amaurosis, as well as in most other nervous affections. Mr. HEY,[‡] of Leeds, published some cases of amaurosis which he considered to have been much benefited by electricity; and the late Mr. WARE[§]

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[*] *Treatise*, &c. p. 462.

[†] *Ibid.* p. 463.

[‡] *Medical Observations and Inquiries*, vol. v.

[§] *Memoirs of the Medical Society of London*; vol. iii. Also, "*A Description of fifteen cases of the Gutta Serena, with incidental remarks*," in *Observations on the Cataract, Gutta Serena, &c.* Third Edition, 1812.

Mr. WARE also commends very strongly the use of a snuff consisting of ten seems to have relied on it almost entirely. Indeed this influence, in all the varieties of its application, as well as various other stimulants, has been tried over and over again in this affection. I have seen no benefit from it. This doubtful remedy is objectionable in the early stage of the complaint, because it supersedes other means, of which the superior efficacy is well established. Nor can I consider it safe at that period, inasmuch as a powerful stimulus is not likely to tranquillize an over-excited organ. For this reason I should consider it dangerous whenever congestion exists in the head, or active disturbance in the eye. The indiscriminate use of electricity, therefore, for which the authority of Mr. HEY and Mr. WARE might be quoted, seems to me both ineligible and unsafe. If, however, the rational means, which a full consideration of the case points out, should have been judiciously tried without effect, the patient may take the chance of this empirical remedy.

Stimuli and tonics.—The generally prevalent notion, that amaurosis depends on nervous debility or atony, has led at all times to the free employment of various means supposed to possess the power of rousing the energy of the retina or of the nervous system generally. Such means, or at least some of them, have been called *antiamaurotic;* and they have not unfrequently been used empirically, one after the other, where the practitioner has not perceived any obvious indications of treatment. A glance over the list that follows will show how much physic must have been wasted in practice conducted on such principles. If I were to enumerate all the remedies of this description, which have been recommended and actually used, the catalogue would comprehend every thing that comes under the head of tonic and stimulant, of nervous, antispasmodic, and antiparalytic. The greatest favourites, however,

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grains of turbeth mineral (not in the London Pharmacopœia; it is the *hydrargyri oxydum sulphuricum* of the Dublin) and one dram of the *pulvis asari compositus* (Dublin Pharmacopœia: it was formerly called *pulvis sternutatorius.*) "A small pinch of this snuff taken up the nose is found to stimulate it very considerably; sometimes exciting sneezing, but in general producing a large discharge of mucus."—*Lib. cit.* p. 405. Mr. WARE afterwards says, that "in order to be more exact in the use of this remedy, I have lately accustomed myself to prescribe one grain of the turbeth mineral to be mixed with twenty grains of the powder of liquorice, of snuff, or of sugar; and one-fourth, or one-third, of this powder to be snuffed up the nose two or three times in the course of the day. And in those cases, where the nose has been particularly dry, I have rendered the powder more effectual by directing the patient to inhale the steam of warm water through the nose previous to the use of the snuff.—p. 417.

have been the various bitters and tonics, the arnica montana, pulsatilla, valerian, bark, black hellebore, calamus aromaticus, camphor, opium, hyoscyamus, musk, assafœtida, castoreum, phosphorus, ether, ammonia, flores zinci, steel, and naphtha; even millepedes have been strongly recommended. If the treatment I have already advised be capable of doing any good; if the pathological views on which that treatment is founded approach in any degree to correctness, all this farrago of nervous medicines and stimulating substances must not only be inefficacious, but absolutely injurious; and indeed, on referring to many of the articles in this list, we cannot suppose that they could be put into the stomach without disordering the health generally. If these substances are capable of doing any good in this affection, then the antiphlogistic and mercurial treatment must be completely wrong. I am, however, firmly convinced that the tonic and stimulating plan is entirely erroneous; that it is founded on mistaken notions, or rather on complete ignorance of the pathology of the affection. Unfortunately this error is not an indifferent one, for if we treat a case of amaurosis on wrong principles, we are not only losing time, which is of the greatest value, but contributing to the progress of the disease. I have seen too many cases where the disorder has been decidedly aggravated by the very means used for the purpose of removing it.

A striking example was afforded by the case of a boy at school, about fifteen years of age. He came home to dine with his family, not having felt ill, nor made any complaint. In helping himself to wine, he poured it, not into the glass, but by the side. It was found, by examination, that the sight of one eye was very imperfect. A gentleman, who was consulted, directed a few leeches to the temple on account of slight pain in the head, and opening medicine; measures of proper kind, but not sufficiently active. At the end of two or three days, the symptoms not being removed, the parents were informed that the imperfection of sight arose from want of tone in the nerve, which must be remedied by generous diet and tonic medicine: the pilula ferri cum myrrha was prescribed. Under this plan, in ten days, the eye first affected had become totally amaurotic, and dimness of sight occurred in the other. I saw the patient at this period, and could only succeed in preserving imperfect vision in the eye last affected.

In the summer of 1831, I saw a lady, thirty years of age, with light hair and grey eyes, of spare habit, married, and menstruating regularly, but without children. She had been accustomed to read much, particularly at night. In the preceding winter she had been troubled with headache, to which she was not subject, and she still suffered much from it. Five months before I saw her, the sight of the right eye had become dim, and the affection had gradually increased. Within a few days she had been alarmed by imperfection of vision in the left eye. She had been told, some time previously, that the affection of the eyes was nervous, and that she ought to take strengthening medicine and to live well. In pursuance of this advice, she drank porter and brandy and water. I found her with a strong and full pulse, hot skin, headache, and foul tongue. With the right eye, of which the pupil was in about the middle state, and motionless, she could see nothing straightforwards: there was still a little sight of objects placed towards her right. The pupil of the left eye was rather smaller than that of the right, and sluggish. Light was very offensive, causing a dazzling, which prevented sight almost entirely. With this eye she could see the smallest print; but she could not read ten lines. Abstraction of blood from the temple, which was accomplished twice by cupping and once by leeches, discontinuance of the dietetic stimuli, and the administration of mercury for six or seven weeks, removed the general excitement and the headache, made the tongue clean, and improved the health considerably. The sight of the right eye, however, was not restored; nor were the inconveniences produced by strong light on the left entirely removed.

The belief that amaurosis depends on impaired energy of the nerve has been strengthened by the circumstance occasionally noticed, that patients feel and see better after the excitement of wine or of a full meal. The failing powers of the retina may experience a momentary increase by the temporary acceleration of the circulation consequent on the stimulus; as ideas are produced more rapidly, and thoughts and language become more powerful and brilliant, when the blood circulates more quickly in the brain, and as the enfeebled stomach of the drunkard is roused by a dram. What should we expect from a regular course of drams, or from permanent excitement of the brain?

Tonics and stimuli, medicinal and dietetic, occasionally find place in the treatment of amaurosis. The disease, in some comparatively rare cases, depends on weakness of the nerve, or is connected with general debility. In other instances the patient is reduced by our treatment, and perhaps by the distress of mind, often amounting to despondency, consequent on the dreadful calamity of blindness. Sometimes, when there is no longer any reasonable prospect of restoring sight, nothing is left for us but to enable the sufferer to bear up under his privation, by upholding the general powers, and restoring the tone of the nervous system. In these several cases there are sufficient reasons for employing medicines of the class now under consideration. My objection is to their indiscriminate use, to their being ranked as primary and principal means in all cases of amaurosis, merely because the nerve is said to be *weakened*, and to the blind empiricism which often administers them in succession, because they have been called *antiamaurotic*.

Use of strychnia.—As this remedy, both in its external and internal administration, has been found a powerful stimulant of the nervous system, in various cases of paralytic affections and impaired sensibility, its powers have been tried in amaurosis. It may be considered particularly applicable to the instances, in which simple want of power, or atony of the nervous structure, without vascular excitement, is the cause of the symptoms. Mr. MIDDLEMORE, who has tried the remedy in many cases, says, "If a person be suffering from loss or diminution of the power of vision from an atonic state of the retina, or other part of the nervous apparatus of the eye, or of the system generally, the local use of strychnia will be, in my opinion, the most likely means of removing the defect, more especially if it be of recent occurrence."

On another occasion Mr. M. describes more particularly the cases in which benefit may be expected from strychnia. "If a patient has over-worked the eye by long continued action, confined to the inspection of objects of the same colour and description, an enfeebled condition of retina, (just as we produce an exhausted state of muscle by over exertion) will take place. If a man subject his eye to an unnatural stimulus, by looking for many hours daily at bright substances of the same or nearly the same colour, or to sudden transitions from an artificial glare to comparative darkness (as miners); or to a diminished stimulus, as by working in dark rooms, or places imperfectly supplied with light; or to any cause allowing the visual textures of the eye to remain, for a long period, in a state of inactivity, as takes place where large opacities of the cornea, and fully formed cataract exists, the power of the retina will be partially destroyed, its susceptibility to the stimulus of light diminished; but in none of these cases will there be found any structural change in the retina or the optic nerve, any congestion of vessels, or any discoverable alteration from a healthy and natural condition; nor will the system, in all probability, be found affected; no altered state of health, sufficient to account for the dimness of vision, will be found to exist."—"Loss or diminution of the power of vision sometimes comes on from certain causes which diminish the vigour of the system generally, as, for instance, after profuse salivation, long continued suckling, menorrhagia, &c. In all these cases, I believe, the strychnia is calculated to produce great and permanent advantage, in combination, of course, with other remedies suited to the particular exigences of the case: for example, if the retina be weakened in consequence of diminished vigour of the system, remedies adapted to strengthen the system, and a removal of the cause enfeebling it, might be joined to the local application of the remedy in question. But the power of the retina will not always return with the returning strength of the system; in such cases the strychnine is singularly valuable, producing, with wonderful rapidity, the restoration of the organ of vision. Strychnine, given internally, does not produce the same beneficial effect upon the retina, as when applied externally."

The mode of employment is to place a blister over the eyebrow, to remove the cuticle, and then dust the remedy over the denuded surface, beginning with the sixth of a grain on each side, and gradually increasing the quantity until one grain is used on each side, or until the head becomes affected. Mr. M. considers that greater effect is produced when the substance is applied over the supraorbitary nerve. He gives the following general directions:—Place a narrow blister over each eyebrow, which must not extend beyond a line drawn upwards from the external canthus; when it has risen sufficiently, cut away the cuticle, and apply, for half an hour, a piece of linen to absorb the serum, which is apt to be discharged in large quantities for a short time after the removal of a blister; then dust the remedy chiefly in the situation of the supraorbitary nerve, but not so thickly as to prevent the absorption of the whole layer of the powder, at the time of the second dressing, which should be twenty-four hours afterwards; this is a proper interval between the dressings; cover the blistered surface with a piece of linen thinly spread with ung. cetacei." "Increase the dose of strychnia very gradually until the state of vision is improved, or symptoms indicative of the injurious agency of the remedy occur. If there be much local pain excited by the application of the strychnia, dilute it with flour, or mix it with opium; and if that do not succeed, suspend its employment, until the stomach and bowels be improved, by a plan of treatment instituted expressly for their benefit, and then resume its use. If severe pain in the head, convulsive muscular twitchings, great general nervous excitement, or other symptoms, denoting the injurious agency of the strychnia upon the constitution, supervene, and the condition of vision be not improved, it must be discontinued altogether."[*]

This remedy has been employed by Mr. LISTON,[†] in the Edinburgh Royal Infirmary. He applied the blisters on the temples, and began with a quarter of a grain of the strychnia on each side, gradually increasing the quantity to one grain and a half, which brought on headache, vertigo, debility, nausea, and muscular tremors. As other means were employed at the same time, the evidence respecting the powers of strychnia is the less clear.

SECTION V.—PARTICULAR KINDS OF NERVOUS AFFECTION.

To the general principles of treatment, which I have now explained, together with the modifications required under certain circumstances, there are some exceptions, which will be noticed in the following remarks on particular kinds of nervous affection.

Affection of the retina from excessive employment; commonly called weakness of sight.—The retina may lose the power of continued exertion from habitual or excessive use of the eyes, as in reading or writing, particularly by candlelight, in drawing or painting minute objects, in microscopic or telescopic observations, or in any other way in which they are closely and intently occupied. I have seen this affection principally if not solely in young persons, especially in university students, and in females who have been employed through several successive hours of the day, as well as by candlelight, in drawing, music, needlework, reading and writing. The power of vision is not impaired; the minutest objects are seen clearly as in the natural state of the eye. But, when it has been exerted for some time, the organ becomes tired: objects appear dull, confused, or distorted, and can no longer be recognized; a sense of weariness comes on in the part, together occasionally with redness and lacrymal suffusion. The eyelid droops, and a painful pressure is felt in the brow. The uneasiness goes off by rest, the powers of the retina are restored, and the eye may be employed again; but, if exertion be imprudently pursued, the organ becomes sooner tired. The time, in which this occurs, varies in different instances, from an hour and a half or two hours to a few minutes. I have seen many instances, in which the patient could not read more than five minutes at a time. No pain is experienced in passive vision, or in looking at distant objects out of doors; nor is even strong light offensive.

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[*] *Report of the Birmingham Eye Infirmary*, in the *Midland medical and surgical Reporter*, May, 1830, vol. ii. p. 158, 159; also, *On the Utility of Strychnia in certain forms of Amaurosis*, ibid. p. 481—485. The remarks are republished in the *London Medical Gazette*, vol. viii. p. 434—437.

In another short notice, contained in the same periodical, Mr. MIDDLEMORE mentions, that in two or three instances it has produced so much headache and spasm, that its employment could not be continued; whilst two or three patients, who were much benefited by it, experienced so much local pain, that they would not persevere in the use of the remedy. In three cases, where it was serviceable, its continued use was necessary to preserve vision, which was invariably lost, when the strychnia was discontinued.—*Ibid.* p. 240.

[†] *London Medical Gazette*, vol. v. p. 541 and 575.

Patients naturally enough call this state weakness of sight. We cannot propose any technical name, because the pathology of the affection is unknown; the mode in which the retina suffers has not yet been ascertained. The term amblyopia, designating the early stage of amaurosis, in which, although smaller objects can be discerned, they are seen under some imperfection, is not applicable to this affection, in which the power of vision is unimpaired.

This disease is very obstinate and tedious, often lasting one, two, or more years, in spite of all our efforts, and appearing at last to cease spontaneously, rather than to yield to medical or surgical treatment. It is not benefited by strong measures, such as cupping, blistering, purging, &c. The state of the organ, or of the circulation in the head, may render moderate depletion by cupping or leeches advisable occasionally; and in the same way blistering may sometimes be required. A principal circumstance is moderate use of the weakened organ: the eyes must not be employed so as to bring on fatigue and pain. The diet and the state of the bowels must be attended to; the patient should live regularly. He should reside in a pure air, and take exercise freely both on horseback and walking. Washing the head every morning with cold water; the cold and shower baths, will often be advantageous. In short, the mode of living should be such as is most favourable to health and strength, most likely to brace the nervous system. Gentle stimuli to the surface of the eye and the lids have sometimes appeared to do good. The vapour of ammonia or ether, the vinum opii, and a stimulant liniment to the edges of the lids, may be employed for this purpose.

In a gentleman, about thirty, whom I saw with this affection, the eyes became tired and painful in about half an hour. There was some unusual vascularity, and he appeared rather of full habit. Scarification of the lids afforded temporary benefit. He regulated his diet, and attended carefully to the stomach and bowels. In four months he was less plethoric, and the eyes were quite natural: he could read for an hour, and sometimes from one to two hours. He washed the head with cold water, paid great attention to diet, and occupied himself considerably with travelling. The affection gradually declined, and might be said to be at an end in about a year and a half from its commencement.

In the following case there may, perhaps, have been a natural disposition to the complaint. I saw, in 1827, a gentleman from Norway, thirty-one years of age, stout and healthy, with fair complexion and blue eyes. His left eye, which had always been imperfect, appeared healthy: the pupil was of middle size, and the iris moved as usual. He could see the first and second sizes of print in the title-page of an octavo. Five years before, the right eye began to be weak, and had continued in nearly the same state. He could see the minutest objects perfectly, and could read the smallest print, but employment either in reading or writing soon fatigued the eye. A brown smoke or mist, and sometimes a bright glare came before it, and in an hour, or an hour and a half, he was obliged to desist. Heat, strong light, and the reflexion from snow in sunshine, were painful: coloured glasses gave relief. The less he used the eye, the better he felt it. Leeches on the temple, with alterative and aperient medicines, were of some service. He had been under my care in London two years before, and had derived benefit from similar measures. Since that time he married, having previously led a chaste life, and he thought himself better for the change. No unusual appearance could be discerned in the right eye. The father and mother of this gentleman had always enjoyed excellent sight; also the grandfather and grandmother, of whom the former could read without spectacles at the age of eighty-seven. He had two brothers; one about twenty, who had laboured for a year and a half under a similar affection of both eyes. The other, rather older, had experienced some degree of the same inconvenience. He had one sister, whose eyes were weak.

Symptomatic and sympathetic amaurosis.—When the function of the retina is disturbed, as it frequently is more or less seriously, not from primary disease of the nervous structure, but from affection of some other part, the state of the organ primarily diseased must be the object of treatment; and no good can be expected from measures calculated to act on the eye. Increased sensibility of the retina, and impaired vision in various degrees, sometimes with squinting and double sight, may be symptoms of disease existing in or affecting the sensorium or its membranes: the questions will be, whether we can ascertain the nature and seat of such disease, and whether we may be able to arrest and remove it.

The retina may be affected in consequence of inflammatory disease originating in and confined to other tunics of the eye, as the cornea, sclerotica, and even the conjunctiva. The cause and nature of the affection are here too obvious to be mistaken.

The retina often sympathizes with remote organs, especially with the uterus and the alimentary canal. To this head must be referred the intolerance of light, *(photophobia,)* whether of scrofulous children, or of hysteric females, various modifications of altered vision, in which objects are confused or distorted, seen irregularly or imperfectly, and impaired sight in various degrees even to complete amaurosis, in children more especially, whose stomach and bowels are disordered, or in young women in whom menstruation either has not occurred, or is interrupted, irregular, deficient, or painful. A careful investigation of the mode in which the affection of vision has begun, and of all the attendant circumstances, with an inquiry into the past and present state of health, will not fail to point out the origin of the disease, and the quarter to which our treatment must be directed.

The effect on the eye of an irritating cause in the stomach is exemplified in a case related in the *Medical and Physical Journal*, for December, 1816. A child seven years old was affected with severe and almost intolerable pain of the left eye, in occasional paroxysms of some minutes, recurring at uncertain intervals, and extending to the eyelids. There was no visible change in the organ. The food was rejected unaltered. The affection had lasted three weeks. An emetic was given in the evening, and a purgative of calomel and jalap the next day. With the motions produced by the latter, a coral bead came away: the little patient immediately recovered.

In the following interesting case, recorded by Mr. WISHART, complete amaurosis of some months duration was caused by a loaded state of the bowels, and cured by clearing the alimentary canal. A boy nine years of age was brought to Mr. W. with complete blindness of the left eye, which was insensible even to bright sunshine: the pupil was of natural size, and the iris moved readily. The right eye was unaffected. Pain was occasionally felt over the left eye. He was pale and languid; and the tongue was slightly loaded. He had been always subject to disorder of the stomach from any irregularity of diet, apparently from his nurse having been in the habit of giving him whiskey to quiet him at night. The loss of sight, which had lasted about four months, was said to have occurred in consequence of his grandmother's death having been incautiously communicated to him. An emetic of ipecacuanha was first administered, and was followed by two pills, night and morning, consisting of the compound extract of colocynth, with one grain of calomel, and the same quantity of James's powder. The emetic and the pills operated freely; the latter were continued for twelve days. The vapour of the liquor ammoniæ was applied to the eye three or four times a day; and at the end of a week, a small blister was placed over the mastoid process, and subsequently dressed with savine ointment. Under a suspicion that he might have worms, a dose of oil of turpentine and castor oil was administered, but no worms came away. On the evening of the twelfth day, when the reading lamp was brought into the room, he said that he could see the light of it; but on trial he could not distinguish the finger, or any object held up before him. The next day a dose of senna tea was given instead of the pills; it operated three times, but less abundantly: he said that he could see his fingers. On the following morning he awoke with a smart attack of fever; with quick pulse, dry hot skin, thirst and head-ache. A copious evacuation of the bowels soon took place in greater quantity than any preceding one, and very consistent, with numerous lumps of indurated fæces About mid-day sight was perfectly restored; he saw every object even as minute as the seconds' hand of a watch. The recovery of vision was permanent, and the patient soon left Edinburgh quite well.*

Amaurosis from debility.—Persons who are ignorant of physiology and pathology may naturally suppose that imperfection of sight depends on weakness of the optic nerve, and that the remedy must be found in means capable of strengthening the weakened structure. We should not have expected that they who understand the structure of the body, the nature and action of the causes which produce disease, and the influences which remove it, should borrow this opinion, and refer amaurotic affections to debility or atony of the nervous structure, or to weakness of the frame generally. The following statement by BEER will show how extensively the notion prevails, and how firmly it is believed.

"The cause of amaurosis very often consists in direct local or general weakness, which may be produced by moral influences capable of agitating the nerves generally, or by real physical commotion of the nerves of the head, more particularly of those belonging to the forehead and eyebrow, by concussion of the spinal cord, by a jump from a considerable height with the whole weight of the body coming on the heels, by concussion of the globe, even by violent and continued sneezing, and still more by contusions of the eye with blunt instruments. One of the causes to which the greatest influence must be ascribed in the production of amaurosis, is the serious direct weakness induced by loss of fluids, as in cholera, continued diarrhœa, in salivation, not forgetting the copious spitting of the tobacco smokers, who in modern times pursue their unmannerly practice in all places, in hemorrhages, in paracentesis abdominis when incautiously performed, in the loss of seminal fluid from excessive venery, nocturnal pollutions or onanism, and in the abuse of issues. General debility, capable of exercising a very prejudicial influence on the nervous structure of the eye, may be induced by other directly weakening causes; for instance, long and bitter affliction, continued vexation, incessant weeping, with constant anxiety about the means of subsistence, particularly if the diet be unwholesome, long fasting and watching, sudden and violent fright, inconsiderate washing and bathing the eyes with very cold water, particularly when they are already weak and irritable, long residence in dark dwellings, especially in the exercise of occupations which strain the eyes, a case very common in Vienna. The amaurosis occasionally seen at the end of typhus, without head-ache, or any signs of excitement in the eyes, and occurring, according to my experience, only after the pure and not the contagious nervous fever, must be regarded merely as a symptom of the general weakness: and this view is supported by the method of treatment, which consists simply in directing a suitable plan of diet."*

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* *Edinburgh Medical and Surgical Journal;* vol. 24, p. 64—66.

It is not necessary to comment on the heterogeneous nature of the influences, which are thus incongruously assembled under the common head of causes weakening the retina; to show that direct injury of that structure by laceration and concussion, as well as excessive exertion of the eye on minute objects, produce a kind of disorder which cannot be called nervous weakness without a total perversion of terms; to observe, that if amaurosis should follow general concussion of the body or typhus fever, the effect must probably be produced through the medium of the sensorium; or to express the doubts which will immediately occur to every intelligent reader, whether amaurosis has ever been produced by many of the causes here assigned, such as washing the eyes with cold water, the discharge of issues, and the spitting incidental to the modern accomplishment of tobacco-smoking. The latter point may be recommended, for attentive consideration, to the amateurs of the pipe and the cigar.

Dimness, confusion of sight, and blindness, previous to fainting, are well known temporary effects referable to the suspension or diminution of the circulation in the retina and sensorium, when the heart's action is enfeebled or stopped by loss of blood or other causes. Two interesting illustrations of this subject occur in Dr. Gooch's Essay on *The symptoms in children erroneously attributed to congestion of the brain.* He mentions the case of a young and delicate child, who had been brought into a state of dangerous and ultimately fatal exhaustion, by the injudicious application of leeches. "The child," he says, "was deadly pale, it had scarcely any pulse, its skin was cold, the pupils were dilated and motionless when light was allowed to fall on them, and when a watch was held to its eyes, it seemed not to see; there was no squinting. Did this state of vision depend on the pressure of a fluid, effused into the brain since the bleeding and during this exhausted and feeble state of circulation, or did it depend on the circulation of the brain being too languid to support the sensibility of the retina? It is well known that large losses of blood enfeeble vision. I saw a striking instance of this in a lady who flooded to death. When I entered the chamber she had no pulse, and she was tossing about in that restless state, which is so fatal a sign in these terrific cases. She could still speak, asked whether I was come, (she knew I had been sent for,) and said, 'Am I in any danger?—How dark the room is!—I can't see.' The shutters were open, the blind up, and the light from the window facing the bed fell strong on her face. I had the curiosity to lift the lid, and observe the state of the eye; the pupil was completely dilated, and perfectly motionless, though the light fell strong upon it. Who can doubt that here the insensibility of the retina depended on the deficiency of its circulation?" Dr. GOOCH adds, that the child died at the end of a week, extremely emaciated and exhausted; that she sometimes revived a little, so as to induce an expectation of recovery; and that she clearly regained her sight, for if a watch was held up to her, she would follow it with her eyes.*

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* *Lehre;* vol. ii. p. 149, 150.

This transitory effect of diminished circulation on the functions of the retina or sensorium must however be distinguished from permanent amaurotic affection, which has not occurred, under my observation, as an effect of the extreme debility consequent on want and starvation, on fevers, and severe bowel complaints, or of that connected with profuse suppurations and repeated hemorrhages, although I have seen some instances of slightly impaired vision referable to the latter cause, and easily remedied by strengthening measures. I have never witnessed an amaurosis under the influence of mercury, that could be ascribed to the quantity of fluid discharged from the mouth. In the case related at page 494, the sudden loss of sight was obviously caused by the excitement consequent on the use of mercury, and not by the ptyalism, which had hardly become established.

It is well known that the energy of the nervous system may be seriously impaired by excessive venery and by onanism: it seems not improbable that the nervous structure of the eye might suffer in the same way by those enervating causes; but no facts of the kind have come under my observation. I am quite convinced that nocturnal seminal discharges, simply considered, are incapable of injuring sight.

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* *An account of some of the most important diseases peculiar to women*; p. 359 | 361.

I shall not, however, deny that the powers of the retina or optic nerve may be impaired by causes, of which the exact operation is not yet understood, and which may be denominated weakening, until we are able to appreciate more exactly their mode of action. And it is an unquestionable practical truth that strengthening treatment, including tonics and stimulants, is employed with advantage in many cases and states of amaurotic disease. One of the clearest cases of this kind is the amaurosis brought on by protracted suckling; the local affection being accompanied by unequivocal evidences of general debility caused by the unusual drain on the system. This occurs particularly among the poor, who keep their children a long time at the breast to prevent the recurrence of pregnancy, being obliged at the same time to work hard, and often with insufficient and unwholesome food. Such women become thin, pale and weak; they are subject to palpitation, hurry of the circulation, and profuse perspirations. Without any apparent change in the part, they complain of dimness, confusion of sight and giddiness, and see imaginary appearances before the eye It is a matter of primary and urgent importance in these cases to wean the child, and to avoid all fatiguing exertion. A good diet, with moderate use of fermented liquors, will be advantageous. The combination of tonic and nervous medicines, such as bark and valerian, or the sulphate of quinine, and mild aperients, if the bowels require them, for example, rhubarb and magnesia, or castor oil, constitute the essential features of treatment. If the affection should not give way to such measures, which it usually does, blistering may be resorted to.

Case. *Complete amaurosis from debility caused by suckling.*—E. N., twenty-five years of age, of slender make, fair skin, and red hair, who had been married a year and a half, had brought forth her first child four months before I first saw her, which was in the middle of June, 1830. She suckled the child, which was strong and took the breast very frequently: her milk was abundant. Lately she had begun to feel very weak; she could not lift a weight, and she cried frequently without having any reason for uneasiness or complaint. Being totally blind, she was led to my house by a friend. She was pallid and had a small feeble pulse. The pupils were in the middle state, and the irides moved slightly. The retina were completely insensible; she could not discern the situation of the window, nor see a lighted candle held close to her. I directed her to wean the child, to drink porter, and take the sulphate of quinine. In a few days, as sight did not improve, I ordered a blister to the nape, and afterwards friction of the tartar emetic ointment in the same situation. When the latter began to produce its effect, the sight mended. On the 2nd of July she could see nearly all objects, but was unable to read: the motions of the iris and the pupil were natural. (To leave off the quinine; four grains of PLUMMER's pill every night; a draught of infusion of rhubarb, with compound decoction of aloes daily.) 16th July.—The pills have been increased to two daily; the health and strength are good; the irides act well, and the pupils are natural. Sight is improved: she can see the large letters over doors, but is unable to distinguish even the capitals of print. As this patient found herself improving, she did not return to me for some time, but continued her medicines. When I saw her in November, she had long left off all treatment, and had resumed her usual active occupations. Her health and strength were good; the sight was completely restored, and she read to me the smallest print with facility.

The following case of amaurotic affection from suckling is related by Mr. WARE. A lady, thirty years of age, found her strength fail after suckling for six weeks, and she soon became incapable even of moving about the house without experiencing painful languor. About the same time her sight also was affected; first only in a small degree, but afterwards so considerably that the full glare of the mid-day sun appeared to her no stronger than the light of the moon. She began to feel a violent pain in the neck, running upwards to the side of the head; and four ounces of blood were taken from the part by cupping. After this, the sight was worse than before, and soon the use of both eyes was entirely lost. The pupils were much dilated, and remained so in the strongest light. The means directed for her were, to wean the child immediately, to apply the vapour of ether frequently to the eyes and forehead, a bark draught three times a-day, and opening medicine on account of costiveness, which had existed since her delivery. On the fourth day, the strength and spirits were improved, and faint glimmerings of light could be perceived, though the pupils remained dilated and fixed as before. The former means were continued, and electricity was employed in addition. The first application of the latter was almost immediately followed by amendment, so that the patient, to whom all objects had before been confused, could now tell how many windows there were in the room, though she was unable to distinguish the frames. On the third day the menstrual discharge came on, and the treatment was left off until it had ceased. At the end of a week she could perceive large objects, and in a short time her sight was so much recovered, that she could read even the smallest print. Her strength did not return so quickly; but it was soon restored by change of air, and a mild nutritious diet.*

If amaurosis should occur in an individual who has been weakened by any of the causes just alluded to, or by others of analogous operation, and if well-marked symptoms of debility should be present, strengthening means, both dietetic and medicăl, must be resorted to, as in the following example.

CASE. *Imperfection of vision from debility consequent on miscarriage.*—I saw a female in 1826, nearly forty years of age, who had experienced a severe miscarriage six weeks previously. She was pallid and feeble; the palpebral conjunctiva was quite white; the motions of the iris and the pupil natural in both eyes. She experienced dizziness with dimness of sight, and saw black specks before the eyes. I desired her to drink porter, to take a dose of powdered bark three times a day, and ten grains of rhubarb occasionally. In three days she was nearly well.

The effect of suckling on the eyes is not always clearly explicable on the supposition of debility. Ordinary inflammatory affections of the organ are more severe and obstinate during this state, so that it may probably exert some general influence of which we do not understand the exact nature.

We must take care not to confound the complaint just described with other modifications of amaurosis, to which women are liable during pregnancy and suckling. In the general fulness, which exists during utero-gestation, and particularly in its latter period, when the pressure of the enlarged uterus impedes the evacuation of the bowels, determination of blood to the head with impaired vision may occur. Venesection, purging, and regulation of diet would be necessary in such a case. Amaurosis may occur during suckling from plethora induced by diet too abundant and stimulating, and particularly by that free use of porter and other strong liquors which are erroneously considered necessary to support the strength of females during this process. The local symptoms are here attended with a full pulse, heat of skin, flushed face, head-ache, and white tongue; an assemblage of circumstances very different from those which attend debility from protracted suckling, and requiring depletion with change of diet.

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* *Observations on the Cataract, Gutta Serena*, &c. 3rd edition, p. 385—389.

Beer states that amblyopia or amaurosis, accompanied with nausea or with vomiting which cannot be quieted, sometimes occurs early in pregnancy, and ceases after parturition. He saw a young Jewess, who, in her three first pregnancies, which followed in quick succession, began to grow blind in the early period, and became quite amaurotic in the third or fourth month. On the two first occasions she continued blind until after parturition; and sight never returned the third time.*

He has also devoted a chapter to what he calls amaurosis from suppressed secretion of milk in suckling women.† In this, which he describes as a very rare affection, he says that all the blood-vessels of the eye are turgid, the pupil slightly dilated, the iris changed in colour and swelled, and the transparent media turbid; that there is amaurotic blindness with intolerance of light and luminous appearances before the eye, and racking pain of the eyebrow and forehead. The complaint is obviously not amaurosis, strictly so called, but acute inflammation of the internal tunics. In the constitutional excitement attending so violent a local disorder, we may expect that the secretion of the mammary glands would be diminished or suspended. It would require very strong evidence to convince us that the latter circumstance and the amaurotic affection stand to each other in the relation of cause and effect. **Beer** says that the prognosis is most unfavourable; and I doubt not that this remark would be fully justified by the event, if the affection were treated in the manner he proposes. Instead of the active antiphlogistic measures so urgently required in a disease of this violent and dangerous character invading the very seat of vision, he is contented with endeavouring to restore the mammary secretion, by poultices with chamomile flowers, hemlock and other herbs, by aromatic herbs with camphor, by rubbing the breasts with flannels strewed with frankincense and mastic: if these means do not succeed, arnica, calomel, and camphor are recommended, with issues.

Amaurosis from affection of the nervus trigeminus.—I have already quoted the papers in which M. **Magendie** has shown that injury or disease of this nerve within the cranium will cause inflammation of the eye, with destructive ulceration of the cornea, and that, ultimately, evacuation of the globe and collapse of the tunics ensue. (See p. 48, note.)

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* *Lehre*, vol. ii. p. 444.

† *Ibid.* 572—575.

A striking illustration of this subject is afforded by an interesting case recorded in the first volume of the *London Medical Gazette*,* by my colleague, Mr. STANLEY. In a lady, forty years of age, inflammation of the brain came on immediately after her confinement: she subsequently suffered severe and almost constant pain in the head. She was confined again about three months before her death. When nearly recovered, she was attacked with pain in the head, more acute than usual, and delirium, which subsided, and were followed by hemiplegia of the left side. During the two last months of her existence, sensation and motion were completely lost in the left side of the face, but the former remained in the arm and leg. Frequent attacks of erysipelas occurred on the left side of the face; from the interior of the left nostril, which was deep red, blood was frequently discharged. Hearing was lost on the left side, and sensation on the same side of the tongue; but motion remained in the latter. Great vascular distension took place in the left eye, and was followed by opacity and ulceration of the cornea, and escape of the aqueus humor. The pons Varolii was enlarged on its left side, so as to compress the trigeminal, auditory, and facial nerves of that side against the basis of the skull. This enlargement arose from a tumour about the size of a walnut, formed in the pons, of which it occupied the whole left side, and extending into the left crus cerebelli. In the eye, which is preserved in the Museum of St. Bartholomew's Hospital, the central portion of the cornea is destroyed by ulceration. The edge of the pupil is everted, and the opening filled by a dark substance. The iris, ciliary ligament, and choroid appear nearly natural. The state of the interior parts has not been ascertained.

Injury, or other irritation of the branches of the trigeminus, may bring on impaired vision or amaurosis. This point has been already illustrated, in reference to wounds of the supra-orbital nerve. (See p. 129.) The sympathy between the trigeminus and the immediate nervous apparatus of vision affords the only explanation of some apparently obscure cases, in which amaurosis seems to have depended on a carious tooth, or on some other local affection seated in the head.

CASE. *Amaurosis caused by a carious tooth.*—F. P., thirty years of age, possessing a good constitution, and enjoying good health, with the exception of pains in the head and limbs, which never lasted long, suddenly experienced, in the autumn of 1825, a violent pain, shooting from the left temple to the eye and the side of the face: he ascribed it to cold. This pain lasted several days, then lessened, and re-appeared from time to time without being sufficiently severe to induce the patient to seek medical aid. In about two months it suddenly increased in intensity, occupying the eye particularly, with a feeling as if it would pass out of the orbit. F. P. now discovered that he was blind with that eye, and applied to a neighbouring physician, whose treatment, continued for two months, did no good. The pain, however, was no longer continual: it assumed a somewhat periodical character, leaving the patient easy for some hours in the day. At the end of the following six months the pain increased, the cheek swelled, some spoonfuls of bloody matter were discharged by a spontaneous opening in the lower eyelid, after which the swelling subsided, and the pains nearly disappeared, although the blindness remained complete. The discharge was renewed from time to time, during the following six months, and there was no great suffering. But in the autumn and winter (1826) the pain, particularly in the eye, became so violent, that F. P. came to Wilna in the beginning of 1827, determined to have the organ extirpated, if no other remedy could be found. Professor GALENZOWSKI found the left eye totally insensible to light, with the pupil dilated, and no other visible alteration. The pain, not then so severe, consisted in violent occasional pricking or darting sensations in the left temple, and parts round the eye. There was discharge from the lower eye-lid. The first molar tooth of the left side was carious; it had not caused much uneasiness; and the tooth-ache, when it existed, had not coincided with the pains in the temple and eye. The professor determined on removing this tooth, and having done so, was surprised to see a small foreign body at the extremity of the fang. When drawn out, it proved to be a small splinter of wood, about three lines in length, which had traversed the centre of the tooth, and had probably been introduced in picking the teeth. A probe passed from the socket into the antrum, from which a few drops of thin purulent fluid escaped. The pain ceased almost entirely, and, on the same evening, the eye began to be sensible to light. Vision gradually improved, so that, on the ninth day, the patient could see as well with the left eye as with the right, after a blindness of thirteen months: on the eleventh day he left Wilna to return to his family.*

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* Page 531.

I had the pleasure of becoming acquainted with Professor **Galenzowsky**, when he visited England subsequently to this occurrence. He showed me the tooth and the splinter of wood. He pointed out two circumstances in the case as particularly worthy of notice:—1st, that the entrance of the foreign body into the tooth had not been noticed at the time; and 2ndly, that a local irritation, hardly perceived in the seat of injury, should have affected the ramifications of the nervus trigeminus so violently as to produce amaurosis.

Amaurotic cat's-eye.—This is the name given by **Beer** to an amaurotic affection, accompanied with a remarkable change of colour in the pupil, which presents, apparently in the fundus of the eye, a lighter tint, yellowish or brownish yellow, instead of its natural clear black. He says that "a pale grey, or whitish yellow opacity, sometimes with a reddish cast in certain lights, is developed in the bottom of the globe, far from the pupil. The sight is not merely weak, but in the strictest sense confused; for all objects, particularly those of smaller size, seem to run together, when the patient attempts to survey any thing attentively. As the disease proceeds, the bottom of the eye becomes clearer and more visible, and the colour of the iris paler, the latter change being particularly obvious in dark eyes. When sight is completely extinguished, we may discern, on close inspection of the pupil, a fine vascular network over the opacity, being apparently the ordinary ramification of the arteria and vena centralis rendered visible on the shining opal-like fundus of the globe. Such an eye, when seen in particular directions, has a yellowish or reddish luminous appearance in twilight, resembling, in some degree, that of the cat, whence I have derived the name." †

The following case of this affection, which is uncommon, came under my observation, at St. Bartholomew's Hospital, in December 1831. **Ann Milling**, twenty-five years of age, of spare habit, dark complexion and hair, and brown irides, has usually enjoyed good health, living in service, and not using her eyes in any occupation likely to be injurious. Seventeen months ago she began to observe a mist or cloud floating before the left eye: in twelve months the sight was entirely gone. She has experienced no pain. The iris is darker than in the opposite eye; it moves in harmony with the other, but has lost its independent action, excepting a slight oscillatory movement. The pupil, which is of natural size, presents a deeply-seated brownish yellow discolouration, which occupies uniformly the whole fundus of the globe, whether observed in the dilated or contracted state of the aperture. Vision is totally extinct. The general health is good.

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* *Archives générales de Médecine*, tom. xxiii. p. 261—264.

† *Lehre*, vol. ii. p. 495—498.

At the London Ophthalmic Infirmary I saw two boys with this affection: one was fourteen, the other eight years old. In the latter both eyes were diseased; vision was entirely lost in one, with a pale and dull yellowish discolouration of the whole fundus of the globe. In the other eye the discolouration was partial; its boundary could be seen when the pupil was dilated, and imperfect vision still remained.

The appearances in the pupil leave no doubt that blindness is caused in these cases by organic changes in the retina and choroid coat; but hitherto the nature of the alterations has not been elucidated by dissection.

We know nothing about the causes of the disease, which has always proceeded, within my observation, to complete loss of sight. BEER, however, says that it seldom reaches this full development, but usually remains stationary after causing a more or less considerable degree of amblyopia. I suspect that the latter observation arises from his classing under this name cases which properly belong to other affections. He says, for example, that the affection called *amblyopia senilis* is probably of this nature; although, with a pale grey discolouration of the pupil, there is often but little diminution of sight. He states that it is more common in the old than in the young, which does not correspond with my experience. And he also represents that it follows violent injuries of the globe. A bright yellow discolouration of the pupil, with inequality of surface, sometimes remains, in the latter cases, after violent internal inflammation, and the globe becomes atrophic. This effusion of lymph, consequent on high inflammation, is a case quite distinct from the disease just described.

The early stage of fungus hæmatodes may be confounded with the amaurotic cat's eye. The distinguishing circumstances may be collected from the description of the latter affection.

Muscæ volitantes.—The imaginary objects occasionally seen moving before the eyes, and called in common language *motes*, are technically termed *muscæ volitantes*, by which name their apparent motion is designated. I have already mentioned them as an early symptom of amaurosis, and consequently as precursors of impaired vision. They frequently, however, occur from some affection of the eye, which produces no other unpleasant effect, and consequently they do not forebode any injurious consequences to vision. Some persons are troubled with them for many years, the sight remaining perfect in all other respects; and it is difficult or even impossible to remove them.

Their appearances are infinitely varied. Sometimes they are spots of various shape and size, black or lighter coloured; sometimes dark, with a luminous edge. They may be streaks or lines, straight, waved, angular, twisted, or united in various ways. Sometimes they appear as transparent bladders, or luminous chains, which are generally undulating. They may have a metallic appearance, like globules of quicksilver; or may seem transparent, like water or glass. Often there is the likeness of an insect, as a spider, worm, or that of a spider's web, or portion of net. In figure, number, size, and colour, they present endless varieties. Frequently there is a single dark spot, moving with the eye, and presenting before any object that is looked at: there may be many such, described as resembling the blacks floating in the atmosphere of London. When they are numerous, they interfere with vision, and annoy the patient greatly. They move with the eye, and appear to descend when the eye is turned upwards, and *vice versa*. Often they are luminous and variously coloured, or like sparks. They are most distinctly seen in a strong light, as when the person is looking towards the sky. They present themselves particularly when the organ is exerted, becoming more inconvenient as the exercise of vision is continued, and compelling the patient to desist. Often one eye only is affected. Sometimes they are seen even when the lids are closed.

Their first appearance is generally traced to circumstances directly affecting the eye, such as unusual and continued exertion of the organ. They will be more likely to occur when the stomach and bowels are disordered, and when the energy of the nervous system is impaired by pressure of business, by anxiety and distress, by severe and continued affliction, or overwhelming grief. Often the complaint seems simply referable to causes of the latter description; and it aggravates the mental disturbance by creating apprehensions for loss of sight.

The important point is to distinguish whether these muscæ volitantes are a symptom of incipient amaurosis or cataract; or whether they arise from some affection of the eye, which causes no other mischief. If they should be attended with a cloudiness of vision, objects being seen as if a mist or fog surrounded them, the case may be incipient cataract, and careful examination of the eye under artificial dilatation of the pupil may be advisable. If other symptoms indicating amaurotic affection should be present, such as a sluggish or motionless state of the iris, alteration of vision in any of the ways just described as indicating affection of the nervous structure, change in the colour of the pupil, pain in the head and eye, we must regard the muscæ volitantes as a symptom of approaching amaurosis. In these respects the shining or fiery objects, such as luminous stars, sparks, and flashes, are the most unfavourable.

If the motions of the iris be perfect, if the pupil possess its natural colour, and if the patient can distinguish minute objects as well as before, the muscæ volitantes need not excite alarm: vision is in no danger.

The immediate cause of this symptom has not yet been satisfactorily explained. The notions of partial pressure on the nervous structure, by distension of vessels in the retina or in the choroid, or by inequality in the surface of the latter membrane, are purely conjectural. The explanation, derived from minute particles supposed to be floating in the aqueus humor, seems to me to rest on no better foundation; at least I have never seen them: and these muscæ, which are seen in eyes apparently perfect, do not occur when a fragment of lens or capsule is in the anterior chamber, or when opaque specks exist in the cornea.

Treatment.—If muscæ volitantes be caused by vascular disturbance of the retina, it is not of a nature to require loss of blood. Without asserting that this cannot be necessary in any case, we may safely say, that in the majority of instances it is neither advisable nor admissible. Should the stomach and bowels be disordered, a dose of calomel and an aperient may be proper. We should then improve the general health by mild alteratives and aperients, attention to diet, and regular mode of living. If the nervous system is weakened, and if the patient is in bad health, and feeble, from confinement, sedentary occupation, unwholesome residence, and other debilitating influences, tonic and nervous medicines, such as bark, the vegetable bitters, valerian, ammonia, camphor, ether, with which conium or hyoscyamus may be combined; and moderate stimuli, whether medical or dietetic, with removal into pure air, will be of service. Where mental causes have been concerned in inducing the disease, change of occupation, as well as of air and scene, may be advantageous in combination with some of the former means.

Mr. WARE * has recommended local measures, such as fomentation of the eyes two or three times a day with warm water, or a warm infusion of chamomile flowers, or of the herb eyebright, and afterwards embrocation of the forehead, temples, and outside of the eyelids, with camphorated spirits, eau de Cologne, Hungary water, or some similar application.

When the health is improved, the muscæ volitantes become fainter and less troublesome. They do not interfere with sight, and are only noticed under particular circumstances, or when attention is expressly directed to them. They do not usually disappear altogether. In three cases related by Mr. WARE, in the paper just quoted, the symptom of muscæ volitantes had existed to a troublesome extent, and had been relieved by suitable treatment. They were seen again at the end of ten, twelve, and twenty-five years, when the objects were still perceived, though only in strong light, or when the attention was directed to the subject. Vision had continued perfect.

HEMERALOPIA AND NYCTALOPIA.

The two states of vision, in one of which persons see imperfectly or are blind by night, and in the other, by day, might be properly denoted by the plain English words night-blindness and day-blindness, though they are more generally called by names derived from the Greek, viz. *hemeralopia* and *nyctalopia*. A great confusion has arisen in the application of these learned terms, each word being nearly as often used to express one affection as the other. HIPPOCRATES uses the term hemeralopia to denote night-blindness, and we may as well follow his example.

Night-blindness, or hemeralopia, (*caligo tenebrarum; dysopia tenebrarum.*)—Hemeralopia is that state of vision in which a patient sees well during the day, but imperfectly as twilight comes on; and, when the affection is fully formed, he loses his sight entirely at the approach of night, not being able to see a lighted candle brought close to the eye. In the commencement of the affection the person can see by moonlight, or when the room is lighted by a candle, but as it proceeds, he can discern nothing after sun-set: in the morning vision returns. There is no unnatural appearance in the eye: indeed if a person can see perfectly during the day, the organ can have undergone no important change. There is a little increased irritability in the commencement, but as the affection proceeds, the pupil becomes rather dilated. It is said, that as the complaint goes on, the retina becomes at length completely insensible.

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* *On the Muscæ Volitantes of nervous Persons*; in the *Medico-chirurgical Transactions*, vol. v. p. 273.

Its duration varies from one night to six or twelve months, or even longer. More generally it lasts from two weeks to three or six months, when left to itself. Relapses are frequent, so long as persons remain exposed to the exciting cause. The *cause* of this affection seems to be the exhaustion of the power of the retina by exposure to strong light during the day; hence night-blindness is only found in those places and climates where there is very powerful light, and is seldom seen except between the tropics. In these regions the full glare of a vertical sun in an unclouded sky, and the powerful reflection of the solar rays from the sea, or from a sandy soil, produce an excitement of the retina to which we are wholly unaccustomed in our latitudes, although in some parts of Europe analogous influences exist in a sufficient degree to cause the affection. After the retina has been so strongly excited in the day, the feeble light of night and twilight does not impress it sufficiently for perfect vision. Europeans often suffer from this cause in the West Indies, and more particularly those much exposed, as soldiers and sailors. The cases are especially numerous among the latter, and great numbers of a ship's crew often suffer.

The *prognosis* of the affection is perfectly favourable; it may exist for weeks or months, yet the organ will perfectly recover, even if left to itself. There is a good description of this night-blindness in the fifth volume of the *Medico-Chirurgical Transactions*, by Mr. Bampfield,* who states that he observed about three hundred cases within a very short time, and in all of them the complaint ended without any permanent injury to vision.

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* *A Practical Essay on Hemeralopia or Night-blindness, commonly called Nyctalopia.*

When I said that hemeralopia was a complaint of hot climates, I did not mean to assert that it never occurs in other situations. Under some peculiar circumstances, it happens in countries situated beyond the tropics. There is an account in one of the periodical works, of its having prevailed extensively among some French troops stationed in Belleisle,* under a combination of local peculiarities, calculated to act powerfully on the retina, and at a season of the year favourable to their influence. In all the cases which I have seen, the affection has commenced in the East or West Indies, and been brought to England.

If the complaint will run its course, and come to an end without injuring the organ, it cannot be necessary to adopt any powerful treatment. Mr. BAMPFIELD had an opportunity of trying various proceedings, and he says, in his essay, that what he ultimately found the most advantageous, was, in addition to the use of aperient medicine, the application of blisters to the temples: they very much abridged the duration of the complaint. In the few instances which I have met with, I have adopted the same practice; with the addition, in one or two instances, of previously taking some blood by cupping, from the temples or nape of the neck. With such treatment the complaint has readily given way.

Day-blindness; nyctalopia.— The opposite state to the former, or blindness during the day, is called *nyctalopia*. There are many states of the organ in which vision is very imperfect, even to blindness, in the strong light of day, and much better sight is enjoyed in twilight and the dusk; but I have not seen this as an amaurotic affection, or a condition of sight opposite to the preceding, dependent on disease of the retina or optic nerve.

In central leucoma of the cornea, in central lenticular cataract, in incipient opacity of the lens, in central opacity of the capsule, in contractions of the pupil from prolapsus iridis or adhesion of the pupillary margin, connected with either of the former circumstances, the patient will see best in a weak light, and find vision very imperfect in a strong glare. The enlargement of the pupil in the former, and its contraction in the latter state, sufficiently account for this difference. On the same ground, sight is much improved in some of these circumstances by the use of belladonna.

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* R. DE HAUTESIERK, *Recueil d'Obs. de Médécine des Hôpitaux Militaires*, tom. 2 & 3. He represents that the complaint is common in Belleisle, a dry and hot situation. Bleeding, vomiting, and purging, followed by blisters, constituted the most successful treatment.

In strumous ophthalmia the intolerance of light often amounts to blindness during the day; while the symptoms remit in the evening, when the eyes are opened, and the patient sees well. Unnatural sensibility to light, and consequent photophobia is the form which sympathetic affection of the retina sometimes assumes. Persons thus affected may be able to see well in dull lights.

The Albinoes are nyctalopic; the absence of pigmentum nigrum renders them acutely and almost morbidly sensible to light; they are hardly able to open their eyes in a strong sunshine; they contract their brows, and keep the palpebræ almost closed during the day, and when twilight comes they are able to see distinctly.

Such are the only forms of nyctalopia which I have seen. I never saw a case in which it existed, as an amaurotic symptom, to the degree of vision being perfect in the night or even twilight, and lost during the day, as we see the converse in hemeralopia.

Want of power to distinguish colours.—Some individuals are naturally unable to distinguish colours, and to judge of their relations. In rare cases this defect embraces all colours, so that a coloured drawing or painting seems all of one tint; the objects are clearly seen, the light and shadow are understood, but the differences of colour are not perceived. Some persons can only distinguish certain colours, and refer the others to one or other of these. Thus a person could perceive only red, yellow, and purple in the rainbow. Some are unable to distinguish one or two colours; red and green, for example, are commonly confounded in these cases. The eye has its natural appearance, and vision is perfect in all other respects.

This incapacity of distinguishing colours, which is an original defect, frequently exists in several members of the same family.

In a person named HARRIS, the defect was first observed at four years of age: he could not distinguish the fruit from the leaves of a cherry-tree by their colour; nor could he understand why a stocking was called red; though he saw objects as well and at as great a distance as others, when the distinction did not depend on colour. The gentleman, who gives an account of this individual in the *Philosophical Transactions*, vol. lxvii. art. 14, says, "I believe he could never do more than guess the name of any colour; yet he could distinguish white from black, or black from any light or bright colour. Dove or straw colour he called white, and different colours he frequently called by the same name; yet he could discern a difference between them when placed together. In general, colours of an equal degree of brightness, however they might otherwise differ, he frequently confounded together. Yet a striped ribbon he could distinguish from a plain one, but he could not tell what the colours were with any tolerable exactness. Dark colours in general he often mistook for black, but never imagined white to be a dark colour, nor a dark to be a white colour." He had two brothers, whose perception of colours was imperfect like his own, and two other brothers and sisters, who, as well as their parents, were free from this defect; one of the first-mentioned brothers pronounced an orange ribbon to be the colour of grass, green. When asked whether the various colours were mere differences of light and shade, various degrees between white and black, he replied no, but with some hesitation.

In an instance recorded in the subsequent volume of the *Transactions*, art. 27, the defect was not so general. The relater, describing his own infirmity, says, "I do not know any green in the world; a pink colour and a pale blue are alike; I do not know one from the other. A full red and a full green the same; I have often thought them a good match: but yellows (light, dark, and middle,) and all degrees of blue, except those very pale, commonly called sky, I know perfectly well, and can discern a deficiency, in any of those colours, to a particular nicety. A full purple and a deep blue sometimes baffle me." He adds, "It is a family failing: my father has exactly the same impediment; my mother and one of my sisters were perfect in all colours; my other sister and myself alike imperfect; but she has a daughter who is very perfect. I have a son and daughter, who both know all colours without exception; and so did their mother. My mother's own brother had the like impediment with me, though my mother, as mentioned above, knew all colours very well."

In the seventh volume of the *Medico-Chirurgical Transactions*, Dr. NICHOLL has related the case of a boy, eleven years old, who has this defect. "He does not call any colour green. Dark bottle green he calls brown. Light yellows he calls yellow; but darker yellows and light browns he confounds with red. Dark brown he confounds with black. Pale green he calls light red; common green he terms red. Light red and pink he calls light blue; red he calls by its proper name. On looking through a prism, he said that he could discover no colours but red, yellow, and purple. I showed him paper stained with red radish root; this he said was blue: I dipped this paper in diluted nitrous acid, which converted the pale red colour into scarlet; he then called it red. I placed this scarlet colour by the side of paper stained with litmus; he said that both colours were the same, but that the litmus paper was a lighter shade than the other. I then placed the scarlet paper on the grass, and afterwards on green baize; he said that the grass and the baize were the same colour as the paper, but that they were a shade lighter. I made him put on a pair of green spectacles, which he called red glasses; he said that every body and every thing in the room had a reddish cast when seen through them."* This boy has four sisters, who, with his mother and her sister, are free from the defect, which however exists in his maternal grandfather. The latter gentleman, being in the navy, purchased a blue coat and waistcoat with red breeches to match the blue. He, as well as his grandson, seems to have no perception of green. He had two brothers and three sisters: the defect existed in one brother, the other and the sisters being free from it. His brother has mistaken a cucumber for a lobster, and a green leaf for a stick of red sealing wax.

A gentleman, who has detailed the circumstances of his own case in the *Glasgow Medical Journal*, vol. ii. art. 2, seems to be most deficient in the distinction of reds and greens. He can distinguish dark green and dark purple; but pale green, pink, and pale blue, all appear to him the same colour. He says, "I cannot perceive a bit of red sealing wax, if thrown down upon the grass, nor a piece of scarlet cloth hung upon a hedge, till I am almost near enough the latter to touch it; although in one instance, which I particularly remember, this was so conspicuous to ten or twelve other persons as to be distinctly visible to them a mile off. I once gathered some lichen, as a great curiosity, from the roof of a fishing house, situated on the estate of a friend. This lichen appearing to me of a bright scarlet, from the circumstance of its seeming to be of the same colour as the roof of the house, which was composed of fancifully shaped tiles; in reality, the lichen was of a bright green, and the tiles of an unusually brilliant red.

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* Page 477, 478.

The communication to the Glasgow Journal, by Dr. COLQUHOUN, in which the preceding account is found, contains a minute history of another instance, in which the defect is particularly observed in regard to red and green, more especially the latter.

This peculiarity, which is an original defect, and not a pathological condition, is seated, according to the opinion of Drs. GALL and SPURZHEIM, in the sensorium. They conceive that the function of the eye is limited to the receiving certain impressions, but that the judging of these impressions, the power of understanding the relations which colours bear to each other, is the function of the sensorium; and they assign this faculty to a particular part of the brain. It is certain that an eye may be excellent for the general purposes of vision, and capable of distinguishing the minutest objects, and yet the individual may not be able to judge of colours. The latter power, with the accurate perception of the harmony of colours, and their various relations to each other, is a higher endowment; indeed, only a few persons possess it eminently. Some can draw correctly, can take a portrait very well, although, if they attempt to colour, they fail entirely. We even find that among the great painters, only a few have attained the reputation of thoroughly understanding the subject of colour, and have been able to reduce that knowledge to practice in their art.

In the case of an original defect, and one probably seated in the organization of the brain, we can afford no remedy: indeed the matter is only mentioned now, in order to show the difference between this natural peculiarity and pathological states of the eye.

Strabismus or squinting.—I have mentioned incidentally the affection in which one eye does not move in harmony with the other. The eye may be turned inwards or outwards, towards the nose or towards the temple, the one case being termed strabismus *convergens*, the other strabismus *divergens*. The deviation is not always confined to one eye; in some cases both are affected, the patient appearing sometimes to squint with the right eye, and at other times with the left. If the sound eye be covered, and the patient be directed to look at any object, the squinting eye resumes its proper position, and can be moved in any direction in obedience to the will; but there are instances in which this cannot be done.

Squinting may be produced by irritation of the stomach, or in other parts of the alimentary canal; thus the presence of worms may cause it. Sometimes it appears as symptomatic of the irritation of teething. It occurs also in consequence of affections of the head, whether they be of a temporary kind, or connected with organic change, as hydrocephalus, acute and chronic, tumours, and other changes of structure in the sensorium. Squinting occasionally attends the commencement of amaurosis, when it is seated in one eye; the disparity between the two organs suddenly produced, seems to cause the want of harmony in their motions; it is accompanied with double vision. The latter is only a temporary inconvenience, and it goes off after a time, even although the cause be not removed.

Certain states of the cornea and pupil are capable of bringing it on; for instance, such corneal opacities as leave an access for light on one side only, will occasion the eye to be turned in the opposite direction, or towards the light; a displacement of the pupil from accident or disease, and its partial obstruction by opacity of the lens and capsule, may have a similar effect.

Inequality of power in the two eyes is said to be the cause of squinting, in the numerous instances, more especially in young persons, in whom it cannot be traced to any obvious occasional influence. The stronger eye is used in vision, the impression on the weaker organ being neglected; hence the movements of the latter do not harmonise with those of the more perfect eye. In young subjects it is difficult to get satisfactory evidence respecting the comparative powers of the two eyes. Again, one may be weaker than the other, without squinting; and some disparity of the two is common.

As strabismus occurs from so many causes, of course the treatment cannot be uniform. A close investigation, with a view to discover the particular cause, is a necessary preliminary to any remedial measures. When this has been accomplished, the course of treatment will be obvious; or we shall see, perhaps, that the defect cannot be remedied. In the forms of strabismus arising from accidental irritation affecting the sensorium or alimentary canal, the treatment will of course turn upon the removal of the cause. When strabismus and double vision occur in the commencement of amaurotic affection, they will disappear if we succeed in removing that disorder. The squinting which is produced from change in the pupil and cornea, will hardly admit of relief.

We find ourselves frequently at a loss in that species of strabismus which occurs in children. As the affection often arises sympathetically from disorders situated in the abdomen, we naturally try the effect in the first instance of an active purgative or two, followed by mild aperients, and combined with regulation of the diet. Failing to remove the strabismus in this way, we sometimes do good by tying up the sound eye for a short period during the day, so that the patient is obliged to exercise the squinting eye. We may do this at first for a quarter of an hour at a time, two or three times a day, and gradually lengthen the period of exercise to an hour or more. We should of course attend at the same time to the stomach and bowels, the diet, and the general management of the patient. It has sometimes happened, that the squinting eye has been cured by this course of proceeding, and the opposite has then become affected.

I have seen no advantage from the use of goggles, from black patches on the nose, and other similar contrivances.

Luscitas.—The eye may be distorted and fixed in its unnatural position by injuries or paralytic affection of one or more of its muscles, by tumours in the orbit, or other changes near the globe. This state, which resembles squinting in the wrong direction of the eye-ball, but differs from it in the want of power to move the affected eye when the other is closed, was called, by BEER, *luscitas.* I have seen it caused by paralysis of the muscles supplied by the nerve of the third pair; in which case the external straight muscle kept the globe permanently in the state of diverging squint. The question of cure will depend on the nature of the cause.

SECTION VI.—NEAR-SIGHT, AND FAR-SIGHT.

These are two defects of vision not dependent upon the optic nerve, but upon the refractive powers of the eye. They are produced by certain configurations of the transparent media, and happen in conformity to the general laws of optics. The rays of light are either collected too soon, brought together before they reach the bottom of the eye, rendering the person *myopic*, or near-sighted; or they are not brought together in front of the retina, the focus in which they would meet being behind the situation of that membrane, so that the person is *presbyopic*, or far-sighted. These kinds of sight are merely consequent upon some conditions of the transparent media of the eye, which, in all other respects, is perfectly natural. The eye, being in a great part of its functions a mechanical instrument, must be subjected to mechanical laws; and we find, that a given configuration of the transparent media, a certain relation of them to each other, and their position at determinate distances from the retina, are necessary to the formation of a distinct picture upon that nervous expansion. There is a certain distance from the eye, which is called the point of distinct vision, at which we can see objects in all their details with perfect clearness. Every eye, considered as an optical instrument, has its point of distinct vision; the latter, therefore, varies in different persons, and is often different in the two eyes of the same individual. Objects are not so distinctly seen, when moved nearer to, or further from, the eye than this point. In ordinary well-constructed eyes, the distance ranges from about fifteen to twenty inches. It must be observed, however, that there are peculiarly strong eyes which can see distinctly beyond these limits on either side. Persons who are obliged to hold objects much closer to the eye than the distance already mentioned, are called myopic, or near-sighted.

Near-sightedness; myopia.—An individual who is myopic, holds a book for reading, or any thing that he may wish to examine minutely, much nearer to the eye than others; he cannot distinguish the countenances of performers on the stage, nor the details of pictures when placed some feet from him; he cannot read the inscriptions on doors and houses, nor recognize persons across the street; if he go into a large room, in which there are many persons, he cannot readily distinguish those he knows. The cause of this is in the transparent media of the eye. Probably there is an original difference in the configuration, or the density of these media, or in the condition of their surfaces. Sometimes the cornea is manifestly more convex, and the anterior chamber, larger than in the normal state. I have seen those changes, with great near-sightedness, as results of obstinate strumous ophthalmia, or other long-continued inflammation affecting the anterior parts of the eye. The affection called conical cornea is attended with myopia, which becomes more and more considerable as the affection advances. (See p. 378.) But, in most cases, the state of the eye appears quite natural, and we cannot discover the circumstances on which the defect immediately depends.

It may be a question whether this state of the eye depends upon the habits of the individual. I am inclined to think, that the habitual mode of employing the organ has some influence. In persons of a literary and studious character, who use their eyes much in reading or writing, and in others who are constantly occupied on minute objects near the eye, we observe that the sight is frequently myopic. I remember once attending a book-sale, at which I was struck by the number of persons wearing spectacles; having counted them, I found there were twenty-three gentlemen in the room, and that twelve of the number had spectacles on. Mr. WARE endeavoured to ascertain the proportional numbers of the near-sighted in the different ranks of society. "I have inquired," says he, "for instance, of the surgeons of the three regiments of foot-guards, which consist of nearly ten thousand men; and the result has been, that near-sightedness among the privates is almost utterly unknown. Not half a dozen men have been discharged, nor half-a-dozen recruits rejected, on account of this imperfection, in the space of nearly twenty years; and yet many parts of a soldier's duty require him to have a tolerably correct view of distant objects." "I pursued my inquiries at the military school at Chelsea, where there are thirteen hundred children, and I found that the complaint of near-sightedness had never been made among them until I mentioned it; and there were then only three who experienced the least inconvenience from it. After this, I inquired at several of the colleges in Oxford and Cambridge; and though there is a great diversity in the number of students who make use of glasses in the various colleges, they are used by a considerable proportion of the whole number in both universities; and in one college in Oxford, I have a list of the names of not less than thirty-two out of one hundred and twenty-seven, who wore either a hand-glass or spectacles, between the years 1803 and 1807."[*]

Mr. WARE mentions the case of a mathematical instrument maker, who had long used convex glasses for reading. After having been employed several hours together, for many successive days, in looking through a double microscope, he has been able, repeatedly, for a few weeks, to read without glasses; this improvement goes off in a few weeks, and he is then obliged to resume his former spectacles.[†]

From these facts, together with the well known far-sightedness of sailors and country people, we may infer, that the habitual mode of employing the eyes has decided influence in rendering them either myopic or presbyopic.

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[*] *Tracts on the Eye*, p. 201, 202.

[†] *Ibid.* p. 228.

Hence it may be true, as Mr. WARE surmises, that the smaller proportion of the near-sighted in the lower classes arises from their not resorting to means for correcting so slight an imperfection, which may be consequently overcome by the increased exertions of the eye to distinguish distant objects. Hence, also, it is probable that the defect may be confirmed by the habitual use of concave glasses, and even increased if the near-sighted person employs those which give him the clearest sight. These at first cause uneasiness, which goes off under their continued employment; and a deeper glass will be required, after some time, to produce the same effect.

Near-sightedness is not observed early in life; persons do not resort to the use of glasses until towards the age of fourteen. The defect may exist previously without being noticed, as young persons do not attend minutely to the state of their sight, or compare accurately their own vision with that of others.

We sometimes see anomalous cases of near-sightedness dependent on some change in the state of the eye, which we are unable to explain. Mr. WARE[*] mentions the instance of a youth at school, in whom it came on suddenly after some previous anomalous nervous symptoms. He was sent into the country for the recovery of his health, with the recommendation to postpone the use of convex glasses until he returned. In ten days he died suddenly. A gentleman, who had found it necessary to use convex glasses at the age of forty, began, when he was fifty, to see distant objects indistinctly, and was obliged to employ a concave glass (number six) for distant sight, though he still used convex glasses of the first number for reading.[†] A woman of fifty, who had become presbyopic, was attacked with dimness of sight and slight inflammation of one eye, for which copious evacuations were necessary. On recovery, she found herself near-sighted, and required concave glasses of the fifth number for seeing distant objects.[‡] In a lady, who had long been presbyopic, inflammation of the eyes occurred requiring leeches and other means. When she got well, she could read without her glasses; but the presbyopia returned in a few weeks.[§]

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[*] *Tracts on the Eye*, p. 206.

[†] *Ibid.* p. 225.

[‡] *Ibid.* p. 226.

[§] *Ibid.* p. 227.

The only mode of remedying near-sightedness is the use of concave glasses; the imperfection of vision is caused by too great a refractive power in the eyes, and we must have recource to artificial measures for lessening it. Our object is to enable the near-sighted to see distant things; indeed, they see near objects very well, and this circumstance has given rise to the notion that their eyes are strong. In order to select the proper glass, the person must try several, and choose that with which he can see a distant object most distinctly. If this is accomplished without any sense of painful exertion in the eye, the glass which will enable him to do so, is that which he should choose. He will probably find that with a glass rather more concave, for instance of the next number to that which he has chosen, he can see still more clearly, but that after looking through it for a short time the eye feels strained and fatigued; he should not allow this slight advantage in point of vision to induce him to expose the eye to an influence that will be injurious. From the use, under proper precautions, of such concave glasses as will rectify the error in the refractive power, the near-sighted person need not apprehend any injury to the eye; indeed, the easy exercise of vision with the requisite optical aid, seems to me less hurtful than the straining and efforts to do without it. As there is some reason for concluding that the optical powers of the eye accommodate themselves to the circumstances under which vision is habitually exercised, I recommend near-sighted persons not to wear spectacles constantly, but only to use them on occasions when they more particularly require such assistance. When they have been worn for a considerable time, the person does not at first see so well on leaving them off as he did before; but this is only temporary. If spectacles, chosen in the manner I have described, be worn only occasionally, there is no fear of the eye becoming more near-sighted, so as gradually to require deeper glasses.

The eye in the progress of age becomes presbyopic, and it might be supposed that this natural change in the organ would remedy the excess of refractive power in the near-sighted, and enable them to dispense with their concave glasses; but this is not the case; the near-sighted continue so in old age. I have known several instances, in which myopic persons were still obliged to use their concave glasses, although greatly advanced in years. To the same effect, Mr. WARE observes, that "the instances are few, if any, in which, if the use of concave glasses has been adopted, increasing years have either removed or lessened this imperfection." * His observations, in another part of the same tract, show that the range of vision, which is comparatively confined in the near-sighted originally, becomes still more limited in advancing years. Neither is there any ground for the notion that near-sight is strong sight.

Far-sightedness.—The opposite state of the eye is called *presbyopia*, or far-sightedness; the former word being derived from πρεσβυς, an old man, because this state of the eye is observed in advancing age, and is most strongly marked in old persons. The eyes undergo certain changes in age, which have the effect of diminishing their refractive power, so that the rays of light are not brought into a focus before they reach the bottom of the eye. The focus of such rays would be formed behind the retina. This is the opposite state to that which we have just been considering. Persons between forty and fifty, and sometimes before that age, generally find that they cannot distinguish near objects so well as they have been accustomed to do. They find it difficult to read small print, or writing, to cut a pen or pencil, or to do any thing that requires a clear near sight. The rays of light are more divergent the nearer the object is to the eye; and the further it may be, the more do they approach to the parallel direction; consequently a greater refractive power is necessary in the former than in the latter case. Far-sighted persons can see distant inscriptions, or distinguish the hour by a distant church clock, when they cannot read a common print held in their own hands, or see the figures and hands of a watch. This state of the organ must be remedied by the use of a convex glass, which bringing together the divergent rays proceeding from near objects, remedies the deficient refractive power of the eye. The glasses must be chosen under the same restrictions as I mentioned in the former case; they must enable the person to see without straining or fatiguing the organ, and should only be worn for reading, writing, or the examination of near objects. This being a defective state of vision depending upon age, it gradually increases, and therefore requires a corresponding increase in the power of the glasses employed.

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* *Tracts on the Eye*, p. 230.

CHAPTER XXVI.

MALIGNANT AFFECTIONS OF THE EYE.

SECTION I.—CANCER OF THE LOWER EYE-LID.

The skin of the face, more particularly of the lower eye-lid, cheek, nose, and lips, is not unfrequently the seat of cancerous disease, which exhibits in this, as in other textures, the successive occurrence and combination of two morbid changes; namely, *induration* and *ulceration*, the latter being intractable, and little affected by external and internal remedies, if not absolutely incurable by such means. This affection, like others of similar nature, seldom shows itself before the middle period of life. I have seen it affecting the eye-lid only in the male sex: in two out of three cases mentioned by Dr. Jacob, the patients were females.* The same affection, in other parts of the face, has been much less frequent in the female than in the male, within my experience.

A hard knot at first forms in the skin, not discoloured, and rising a little above the surface. The patient calls it a wart, but the entire and natural state of the cuticle obviously distinguishes this scirrhous tubercle from warts, of which the cuticular covering is thick, rough, and fissured. The first tubercle is slowly followed by others, which make with it a single small group or mass; they are equal in size to small peas or large pins' heads. The portion of skin, on which they are situated, is somewhat swelled and hard; a few red vessels are sometimes seen on it and on the tubercles, which in other respects present the natural appearance of skin. After some time, superficial ulceration occurs, the denuded surface appears as a mere excoriation, producing a thin yellow fluid in small quantity, which dries into a thin scale. If this is not disturbed, the part will remain for a long time without any apparent change. The disease spreads in the same manner, by the formation of cutaneous tubercles and ulceration, the process being so extremely slow, that many years often elapse without the ulcer exceeding the magnitude of a sixpence or a shilling. In this state it presents a superficial ulceration, smooth, and without granulations, with an irregular knotted margin. It is at first confined to the cutaneous surface of the eye-lid, and it often remains so for several years; in other instances, when it has reached the ciliary margin, it slowly destroys the whole thickness of the lid by ulceration, and makes its way into the orbit between the globe and the bone. In its early period, and indolent state, it causes little or no pain. When the ulcerative process is more active, the complaint is painful; there is often considerable uneasiness from irritation of the globe by the edge of the ulcer when it is destroying the lid. The health does not suffer, being often unimpaired even when the ulcer has attained considerable magnitude.

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* *Observations respecting an ulcer of peculiar character, which attacks the eye-lids and other parts of the face*; in Dublin Hospital Reports, vol. iv. p. 232.

The lymphatic glands are not affected; nor have I ever seen secondary cancerous affection of other parts.

Although the progress of the disease, taken generally, may be called destructive, there is sometimes partial reparation and cicatrization. The surface thus restored is generally irregular, and not like a healthy cicatrix: and, while cicatrization is proceeding in one part, the disease extends in other directions. I had a patient, about forty years of age, with an ulcer of this kind about one inch and a half in length, and three quarters of an inch wide, on the cheek, at the side of the nose. The complaint, which had lasted six years, began on the ala nasi, of which it had destroyed a considerable portion. The part first affected had cicatrized soundly, and the sore still had a healing edge on the side next the nose. The margin in other parts was indurated and irregularly elevated; the surface was not deep; it was smooth, red, without granulations, and it produced, in small quantity, a thin yellow matter, without any offensive odour. When I had extirpated this disease, I found that the basis of the ulcer was the cutaneous texture about twice its ordinary thickness; firm, of greyish colour, and with the semi-transparency belonging to scirrhous induration.

There can be no danger of confounding this complaint with syphilitic ulceration of the palpebræ, which I have described at p. 343 to 346.

Nor is it likely to be confounded with lupus, which does not affect the eye-lids. The tubercles of lupus are larger, red, and scattered; sometimes the cuticle covering them becomes scaly. In carcinoma, the tubercle is at first single, and subsequently only a single group, unaltered in colour, and without change of the cuticle. The ulceration of lupus has a tawny surface, often with bloody points or streaks, secreting a yellow matter which forms yellow scabs: the margin is sharp and ragged, and the surrounding skin bright red. The carcinomatous ulcer has a smooth, red surface, and a knotted edge; and the surrounding skin is of the natural colour.

Dr. Jacob, who, in a paper already quoted, has described this disease as he had seen it in three instances, considers that it "is peculiar in its nature, and not to be confounded with genuine carcinoma; from which," he says, "it is distinguished by the absence of lancinating pain, fungous growth, fetor, slough, hemorrhage, or contamination of lymphatics."* If, by genuine carcinoma, Dr. Jacob means that of the female mammary gland, the correctness of his opinion will be allowed, though all the circumstances he has mentioned are not found in every case and stage of that affection. The present affection appears to me to be genuine carcinoma of the skin, and not to differ from the progress of the disease so called in other textures, more than the differences of organization will explain. The phenomena and progress of the affection are even modified in different parts of the integuments; it is different in the hands and in the organs of generations from the course which I have described it to pursue in the face, though it every where exhibits the same leading features of primary scirrhous induration and subsequent intractable ulceration.

The *causes* of this affection are involved in the same obscurity as those of cancerous diseases generally; we are altogether ignorant of the circumstances which either immediately or remotely give to morbid affections this peculiar character. Within my experience it has always occurred spontaneously in healthy subjects, and almost exclusively in males. Juengken,† on the contrary, states that it is more frequent in women than in men; that it is seldom seen as a pure idiopathic affection in individuals otherwise healthy; that in general it occurs only in cachectic subjects, and that a strong predisposition to the complaint is produced by certain cachexiæ and dyscrasiæ, particularly by scrophulosis, arthritis, and syphilis larvata. According to the representations of BEER,[*] with whom JUENGKEN,[†] ROSAS,[‡] and other writers[§] agree, scirrhus of the eye-lids may proceed fromthe chronic swelling consequent on scrofulous inflammation, (*tylosis*, see p. 339,) or from the induration remaining after hordeolum, especially when injudiciously treated, in scrofulous persons; while this scirrhous induration may degenerate into cancer when the scrofulous subjects labouring under it suffer from other causes, such as syphilis, itch, gout, or scurvy, or when irritating applications are made to the part. He states further, that in individuals who have long been highly scrofulous, destructive cancerous ulceration may attack the eye-lids from the repeated irritation of an encysted tumour by stimulating applications, or from the development and improper treatment of an inflamed, painful, and wart-like tubercle on the ciliary margin, (*papula maligna*.)[‖]

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* *Lib. cit.* p. 236, 237.

† *Lehre von den Augenkrankheiten*, p. 603.

If the causes assigned by these writers were capable of producing cancer of the eye and lids, it ought to occur frequently; it is, on the contrary, a rare affection. To account for the wide difference between their statements and my own experience, I must conclude, either that scirrhus and cancer are much more common on the continent than in this country, or that they employ the terms in a more comprehensive sense than we do.

Treatment.—I consider excision to be the proper treatment, whenever the situation and extent of the disease will admit of its complete removal; and that it should embrace, not only all the parts altered in structure, but also, if possible, a portion of the surrounding healthy substance. As the health is undisturbed, no benefit can be expected from internal remedies. External irritating applications often bring on pain, and render ulceration more active. When the disease is of small extent, it may be destroyed by an escharotic sufficiently powerful to kill the whole affected texture; but this process is less satisfactory than excision, as I found in an instance where I destroyed a small growth of this kind on the ala nasi, by means of arsenic.

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[*] *Lehre*, vol. ii. pp. 50 and 140.

[†] *Loc. cit.*

[‡] Common warts may become cancerous from the supervention of a morbid state of constitution, (*dyscrasia*,) or from mechanical and chemical irritation. *Handbuch*, vol. ii. p. 118. In another place he says, that cancerous ulcers of the lids depend on some hitherto imperfectly known malignant modification of scrofula, gout, or other dyscrasiæ; that they appear as consequences of encysted tumours, warts, or more frequently of scirrhus, and that the occasional causes are accidental, mechanical, or chemical injuries of the lids, or curative attempts with stimulating escharotic or even mechanical means. He adds, that in many cases no such immediate cause can be assigned. *Ibid.* p. 139.

[§] According to SABATIER, cancer of the lids and globe may arise from scirrhous tubercles, from pimples of dartrous character, from fungous excrescences, and from obstinate ophthalmia, terminating in partial or local abscesses. It is excited by the imprudent use of acrid and irritating local applications, especially caustics, but it depends on an internal disposition, which can neither be prevented nor corrected. *De la médecine opératoire*, 1824; vol. iii. p. 346. Analogous opinions respecting cancer of the eyes are delivered in the *Dictionnaire de med. et de chir. pratiques*, tom. iv. p. 536, 537. The writer assigns as causes of cancer of the eye, chronic inflammations, whether external or internal, and protrusions of the globe consequent on disease of the orbit or surrounding parts.

[‖] *Lib. cit.* p. 140—143.

Dr. JACOB's experience on this point seems to coincide very nearly with my own. "It remains," he says, "to be determined whether this disease can be removed by any other means than the knife or powerful escharotics; and from the experience I have had in those cases, I am inclined to conclude that it bids defiance to all remedies short of extirpation. I have tried internally alterative mercurials, antimony, sarsaparilla, acids, cicuta, arsenic, iron, and other remedies; and locally, simple and compound poultices, ointments, and washes containing mercury, lead, zinc, copper, arsenic, sulphur, tar, cicuta, opium, belladonna, nitrate of silver, and acids, without arresting for a moment the progress of the disease. I have indeed observed that one of those cases which is completely neglected, and left without any other dressing than a piece of rag, is slower in its progress than another which has had all the resources of surgery exhausted upon it. The success even of powerful escharotics is doubtful. MARY SHERLOCK, the old woman who has laboured under the disease for twenty-three years, and who is now in the incurable hospital, says that "a burning cancer plaster" was applied several times, seventeen years ago; and she has lately had the arsenical composition, called Plunkett's powder, applied without any good effect. The gentleman to whose case I have alluded had the sore healed, when it was very small, by the free application of lunar caustic, under the care of Mr. TRAVERS; it however broke out again, and spread without interruption, until it destroyed the lids and globe of the eye, under which circumstances he, in despair, submitted himself to a popular charlatan, who, bold and fearless from ignorance, gave a full trial to escharotics; he repeatedly applied what I understood to have been a solution of muriate of mercury in strong nitric acid, and in a short time excavated a hideous cavern, extending from the orbitar plate of the frontal bone above, to the floor of the maxillary sinus below, and from the ear on the outside to the septum narium within; yet the unfortunate gentleman survived, but the disease preserved in every respect its original character. Mr. COLLES, however, tells me, that in a case which came under his care, before the disease had extended to the lids, he succeeded in establishing a permanent cure by the application of a powerful escharotic, covering up the eye, during the operation of the remedy, with gold-beater's leaf."*

We possess, however, some means of relief, even in the unfortunate cases, where the extent of mischief precludes the effectual remedy of extirpation. Mild antiphlogistic and soothing measures not only alleviate suffering, but sometimes induce restorative efforts more considerable than we could have expected, as will appear from a case subsequently related. (See CASE IV.) The observations on the local and internal employment of narcotics, when there is severe pain, in the treatment of carcinoma of the eye, are equally applicable to this affection. The following histories are selected to exemplify the foregoing description and remarks.

CASE I. *Carcinoma of the lower eye-lid, of seventeen years duration: extirpation of the disease, and permanent cure.*—A gentleman, between fifty and sixty years of age, employed in painting and drawing, had a disease of the lower eye-lid, which began seventeen years before I saw him, with what he called a small wart. It gave him no trouble, so that he paid little attention to it. Caustic was once applied; it produced a scab, and the surface afterwards became clear again. It had increased, and become troublesome in using the eye. The disease, when I first saw the patient, was about equal to half a large filberd, and occupied the inner two thirds of the eye-lid. It reached at the internal angle to the root of the nose; the upper edge extended to the margin of the lid, where it seemed inseparably connected to the tarsus; below, it was moveable on the subjacent parts. It was a swelling of the skin, knotty at the edge, with a few red vessels ramifying on it, and two or three small smooth ulcerated surfaces towards the centre, producing a clear yellowish fluid, which formed a thin adhering scab. I removed it in April, 1828, and found it easily separable from the tarsus, though they had appeared so closely united; the latter was denuded in its whole depth. The disease was strictly cutaneous, with a regularly defined circumference, not extending into the surrounding textures. Two small smooth

* *Lib. cit.* p. 237, 238.

cysts were found near the surface of the tumour. wound was soundly healed in three weeks, without any c inconvenience than a slight degree of ectropium, which tinues to the present time, (1833,) the cure in other resp being perfect.

CASE II. *Carcinoma of the lower eye-lid, which existed five years: extirpation, and permanent cure.*— patient was a gentleman about fifty-five years of age sound constitution, and good health. The disease occupied ciliary margin and the external surface of the lid. It b with the formation of small hard knots, on which a few vessels ramified; superficial ulceration ensued, without n discharge. It had proceeded very slowly, so that at the of five years it did not occupy the whole eye-lid Var local and general means, employed at different times, ha effect in checking the progress of the complaint. He used calamine cerate, spread on thin rag, to cover the ulc tion. Carbonate of iron, made into a paste with water, applied with a fine brush, seemed to have afforded s relief. When I saw him, the disease occupied rather m than the inner two thirds of the lid, reaching quite to the of the nose; the inferior punctum lacrymale could not discovered. The lid, more than twice its natural thickn was knotted externally and ulcerated; the irregular in margin of the ulceration occasionally irritated the globe. T was the only inconvenience, for the disease had never gi much pain. I removed the parts in December, 1825, cutt quite clear of the disease below, and externally. It wa close to the bone, on the inside, that I could not feel equ confident of having removed the whole morbid growth. soft rag doubled and dipped in water was placed over eye. The wound, although large, healed rapidly; and patient was able to leave town in ten days. In Febru 1826, the cicatrix was firm. Although the lower eye- with its punctum lacrymale, had been removed, there was deformity, nor any inconvenience from watering of the This gentleman, whom I have seen at various times up the present, continues perfectly well. No deformity, nor other unpleasant result, remains from the operation.

CASE III. *Carcinomatous ulceration of the lower eye-l extirpation: return of the disease.*—G. S. fifty-five years age, came under my care, in St. Bartholomew's Hospital, January, 1829. The complaint, which was an ulceration the lower eye-lid, with indurated margin, had begun se years before, in what the patient called a small pimple. The disease extended to the internal angle, where the indurated mass adhered firmly to the bone, and it occupied also the whole external angle of the lids. It had been generally easy, but occasionally painful; various means had been employed without benefit. I removed the whole lower eyelid with a small portion of the upper at each angle. The disease adhered so closely to the nose on the inside, that I could not feel certain of having removed it effectually. The wound proceeded very favourably. Some inflammation of the conjunctiva occurred, but soon went off, leaving the cornea quite clear. The cicatrix caused contraction of the palpebral slit; but a sufficient opening remained, when he left the hospital, for tolerable use of the eye. The patient remained well until the beginning of 1832, when uneasiness began to be felt in the internal angle of the eye. This gradually increased, and he came to town in the beginning of the summer. There was return of the complaint along the cicatrix, more particularly towards the internal angle. The conjunctiva between the scar and the globe seemed to participate in the affection; it was thickened, preternaturally red, and exhibited granular masses advancing on the cornea, which in other respects was healthy. It appeared to my colleagues and myself that the disease could not be satisfactorily removed without including the globe in the operation; the patient being averse to this proceeding returned to the country.

Case IV. *Carcinomatous ulceration of the lower eye-lid and cheek, healing under the application of leeches.*—A man of spare habit, sixty-four years of age, was for a long time an out-patient of St. Bartholomew's Hospital, on account of a large ulcer with unequal surface, knotted and irregular margin, which had commenced about twenty-four years previously. The boundaries of the ulceration were the bridge of the nose and the left ala nasi, the left angle of the mouth, the left inferior palpebra, which had been nearly destroyed, and the left temple. The eye had been occasionally inflamed, but had not suffered materially. For some months it was dressed with a lotion of distilled water, and liquor opii sedativus, the latter being in the proportion of one-third or one-half. This eased the pain which had been considerable: the health was perfectly good. The discharge from the sore was so sparing, that the lint, by means of which the lotion was applied, adhered firmly. The surface used to bleed freely on its removal, which suggested the idea of taking blood by leeches. Six were accordingly applied, and with so much benefit that they were repeated. The progressive improvement in the sore led to two or three further repetitions. In the course of a short time, nearly the whole of this extensive ulcer cicatrized; the surface continuing unequal, and the edge knotted. The only part which did not heal was towards the external angle of the eye, where a portion of skin formed an uneven tuberculated mass with small superficial ulcerations. The neighbouring integuments were strongly drawn towards the lower part of the orbit by the contraction of the cicatrix. The opiate lotion was still applied to the part which had not healed. The patient was free from pain and in perfect health. He continued well for about a twelvemonth, when he died, as I was informed, after a short illness, from erysipelas of the head.

While the preceding case was under observation, an old man became my patient in the hospital, with a cancerous sore at the angle of the mouth, of many years duration. It was so considerable, that excision would have been hardly practicable, even if there had not existed a considerable indurated enlargement of the submaxillary absorbent glands. Erysipelas of the face came on, and was severe. As he was recovering, the sore lessened, and its raised edge sunk considerably. It seemed in a fair way for healing when he left the hospital on his return to the country.

MALIGNANT DISEASES OF THE EYE.

Of the inflammatory affections incidental to the eye, and the changes of structure which they produce, many are injurious to the organ, so far as vision is concerned; but they are not dangerous to life. The eye is subject to other diseases, which not only impair and destroy its function, but are so intractable as to endanger life itself. It may be affected with cancer, and with that peculiar change, in which the component tissues are converted into a soft texture, sometimes resembling that of brain. In the latter cases, and in cancer, there is ultimately more or less change in the figure of the globe, more particularly by the appearance, on its anterior surface, of unnatural protrusions denominated fungous. Hence has arisen the somewhat vague and indefinite expression of fungoid diseases. There are affections of the eye, attended with the formation of fungus, which are not of malignant character, though they commonly prove destructive to the part as an instrument of vision. I shall first describe some of these.

SECTION II. — DISEASES IN WHICH FUNGOID OR OTHER GROWTHS, NOT OF MALIGNANT CHARACTER, TAKE PLACE FROM THE ANTERIOR PART OF THE EYE.

Sometimes innocent fungous excrescences arise from inflammation affecting the anterior part of the globe. After severe external ophthalmia, with considerable redness, and often violent pain in the organ, a fleshy vascular substance may spring up from the surface of the sclerotic coat, from the orbiculus ciliaris, or from the cornea; or such a production may proceed from the iris, and cause ulceration of the cornea. Vascular or fungous growths, arising in this way, may assume a formidable appearance for some time, and then gradually subside, the eye going into a state of atrophy. After the existence of severe inflammation, a bluish prominence may arise in the seat of the orbiculus ciliaris, apparently proceeding from within outwards, so as to induce the suspicion that it may be a fungus arising from the interior of the globe. This swelling may become yellow, break and discharge matter; after which the globe shrinks, without further injury to the patient. In the following instance, such swellings subsided without giving way externally.

CASE.—*Acute ophthalmia, with the formation of yellow prominences in the situation of the ciliary body; spontaneous disappearance, and atrophy.*—A child about six years old came under my care at the London Ophthalmic Infirmary, with serious external inflammation of one eye, attended with so much swelling of the palpebræ, that the exact state of the globe could not be ascertained. Heat of skin, quickness of pulse, furred tongue, great pain in the eye and head, restlessness, and want of sleep, showed that the local inflammation must be serious. At the end of three or four days, when this had been reduced by leeches and suitable internal means, I succeeded in obtaining a view of the eye, in which there was vivid external redness, with a dull state of the cornea; the iris was pushed forwards and the pupil partially opake. In spite of antiphlogistic measures, the child continued to suffer. A tumour gradually arose behind the edge of the cornea; it was of yellowish colour, and acquired the size of a horsebean. Subsequently, two or three other projections took place, of smaller size, arranged with the first, in a regular series, at a short distance from the margin of the cornea. The inflammation still continued severe, although leeches and aperients had been frequently used. The mother said that the child still suffered from "inward fever," which did not yield to the measures employed. When several weeks had elapsed, the inflammation abated; the pain became less, and the protuberances round the cornea diminished in size. At last, the latter completely shrunk, the eye became atrophic, and the child recovered without any further ill consequences.

The two following cases occurred in the practice of MR. SAUNDERS.

CASE I.—*Fungous excrescence in the situation of the corpus ciliare, ulcerating and discharging: spontaneous cure, and atrophy of the globe.*—In a girl, ten years old, who was brought to the London Ophthalmic Infirmary, "the sclerotica was unusually vascular, but not inflamed. The vessels were large and serpentine. The iris, retired from its situation, seemed to be twice as far from the cornea as is natural. The pupil was dilated, and the iris contained many distinct red vessels. The cornea, the aqueous, crystalline, and vitreous humours were at this time transparent. In the course of a few weeks the crystalline became opake; the iris, covered with lymph, and red as if injected, advanced towards and touched the cornea; shortly, a blue excrescence was thrown out at the superior part of the eye, at that part of the sclerotica which unites with the ciliary ligament. It increased rapidly, and became as large as the anterior portion of the globe. This tumour ulcerated; for a long time a thin watery fluid was discharged, then pus, and lymph, which trailed out through the aperture. After some months this aperture closed, the eye-ball, much reduced in bulk, became tranquil, and even retained some vestiges of the cornea, the blue excrescence being totally extinct. During the process there was nothing like acute inflammation, and the pain was very trivial."[*]

CASE II. *Fungous growth proceeding from the iris: spontaneous cure.*—"In 1809, a boy about three years old was brought to the infirmary. On the inferior part of the iris, a small patch of lymph was deposited, the pupil was not influenced by it, but varied as usual. There was no ophthalmia, nor any irritability from exposure of the organ to light. In a fortnight the mass of lymph was so much increased, that it occupied the inferior half of the anterior chamber. Now a process of organization commenced in the lymph, and an action analogous to inflammation was set up in the cornea; it became turbid and vascular, the iris and cornea wasted, a blue mass arose in the situation of the ciliary ligament, which, together with the whole of the cornea, ulcerated or suppurated, and an ill-conditioned and very luxuriant fungus shot forth. By degrees this fungus diminished, and finally the eye-ball healed."*

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[*] *A treatise on some practical points relating to diseases of the eye,* &c. 2nd edition, p. 143, 144.

Some years ago, in a boy about eight or nine years of age, I saw an apparently simple vascular growth of a light brown colour, equal in size to a large pea, proceeding from the iris, without much redness or pain, and without opacity of the pupil. It had caused ulceration in the cornea, and thus appeared externally. As the young patient was removed to his residence in the country, I did not witness the progress or termination of the case, but I was informed, that the tumor subsided after a time, and that the eye shrunk into its socket.

In his *Synopsis of the Diseases of the Eye*, Mr. TRAVERS has mentioned a case in which the globe was extirpated by SIR ASTLEY COOPER, and has given a figure representing the appearance of the part on a section.† The patient, forty-six years of age, and the mother of nine children, had generally enjoyed good health. Two years before she underwent the operation, the cornea of her left eye had become opake from chronic inflammation. "In this state, after a severe attack of fever, the surface of the eye began to throw up a vascular fungoid tumor. On her admission it was of the diameter of a shilling, covering the cornea and a part of the sclerotica, and protruding between the eye-lids. It was slightly lobulated, of a dark purple colour mingled with red: it sometimes bled, but was never painful." The recovery from the operation was speedy. "*Dissection of the eye.* The tumor is situated without the globe; it appears pulpy, vascular, and of an unequal dark colour. It is of a square figure, formed of various lobes, separated by delicate fibrous bands, and adheres to the sclerotic and the margin of the cornea. These two membranes could be traced entire beneath the tumor. The globe being divided, the vitreous humour escaped in a liquid state and of a yellow colour. The lens had disappeared. Within the globe and opposite to the outer tumor, is another and a smaller morbid growth, which has no communication with the former, and is of a softer and very vascular substance. It occupies the lower and anterior part of the globe, raises and compresses the retina, and is distinctly situated between the layers of the choroid coat."

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* *Treatise on some practical points relating to diseases of the eye, &c.*, 2nd edition; p. 144, 145.

† *Synopsis, &c.* p. 416, 417. plate vi. fig. 2.

A singular example of peculiar morbid growth, resembling a congeries of dark purple roundish masses like black currants, proceeding from and covering the cornea, has been described and delineated by MR. TRAVERS. He says, "I excised the anterior hemisphere of the eye-ball in an elderly lady, in whom the cornea was concealed by a tumor, of a dark purple colour, protruding to such an extent between the eyelids, as to occasion great inconvenience and deformity. It had the appearance of being disposed in lobes, somewhat resembling a bunch of currants of unequal size. On dissection, the cornea and sclerotica proved to be entire, and the morbid growth, lying upon and adhering to the corneal and a small portion of the sclerotic surface, had acquired the lobulated appearance, as if by degeneration of the covering conjunctiva, for delicate white bands, the only vestiges of this membrane, were seen intersecting the lobules at irregular distances, in the form of septa. The substance, in section, was firm, of a dark colour, here and there mottled with white, and measured a quarter of an inch in thickness from the external surface of the cornea."* "It was not characterized by any symptom of malignity; neither pain in the ball nor in the head worthy of notice, nor any affection of the constitution. The deformity and the fear of its increase were the inducements to the operation, which was done about a twelvemonth ago. This was attended by no untoward symptom, and up to this time, the subject of the disease has continued well."†

In the description of the figures, MR. TRAVERS says, that the substance of the growth was in some parts pulpy, in others firm; that there was at one part, near the surface, a whitish spot of cartilaginous hardness: that the fungus was covered by a thin membrane easily torn, supposed to be the conjunctiva: he concludes that the disease originated from the latter membrane, and supposes, from its lobular arrangement, that the morbid growth occupied the cells of the substance connecting the conjunctiva to the cornea.[*]

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* *Lib. cit.* p. 102.

† *Lib. cit.* p. 418.

The two following cases, related by SCARPA,[†] seem to have been analogous to some of those already mentioned.

PIETRO CAMPARI, aged forty-eight, a husbandman, of unhealthy constitution, subject to intermittent fever, and afflicted with chronic rheumatism, was suddenly attacked with pain in the left eye, which he attributed, without reason, to the entrance of some extraneous body between the eye-lids. Violent inflammation soon took place in the eye, and was succeeded by total opacity of the cornea. Shortly afterwards, an excrescence of the size of a split bean arose from this opake membrane, surrounded by blood-vessels highly turgid. In the course of a fortnight, the sarcoma increased to such a degree, as to project beyond the edges of the eye-lids. In this state the patient was brought into one of the wards of the hospital, where the excrescence was removed by means of the ligature, and afterwards the application of caustics and the ointment of JANIN. The patient went out supposing himself cured; but in a short time afterwards the sarcoma returned, and became larger than before, with an extensive base, which, however, was soft and flexible in every part of it. Darting pains, extending to the head, disturbed the patient night and day, notwithstanding the use of opium internally, and externally of anodyne cataplasms. In order to remove the disease effectually, SCARPA considered the excision of the anterior hemisphere of the eye-ball necessary. The operation was performed by the late Professor JACOPI. The recovery was speedy and permanent. The state of the excised portion is not mentioned.

GIOVANNA GANDINI, a peasant girl, fourteen years of age, of weak constitution, had experienced in her sixth year a violent inflammation of the left eye, followed by complete opacity of the cornea and staphyloma. Lately, after a still more severe inflammation, the anterior hemisphere of the eye had been converted into a reddish painful fungus, of cancerous aspect, except that it was everywhere soft and yielding. Complete extirpation of the globe was performed by Professor MORIGI. The cure was completed in two months, and no return of disease had occurred at the end of a year and a half. The soft fungus was found to be confined to the conjunctiva, cornea, and a portion of the sclerotic coat anteriorly; and the fundus

[*] *Lib. cit.* plate ii. fig. ii. and iv. p. 394, 396.

[†] *Treatise on the principal diseases of the eyes,* p. 515—518.

of the eye, sound in every respect as to its membranes, contained only a limpid fluid instead of the vitreus humor.

Scarpa* quotes from other writers four instances, more or less similar to the preceding, in which extirpation of the globe was practised. The view which he takes of the subject is, that the fungous excrescences from the conjunctiva and cornea, although indolent and benign at their commencement, become, when left to themselves or empirically treated, in process of time, malignant and really cancerous.† He says, that even in the course of six months, such a complaint may pass from the state of softness to that of scirrhous induration with hard warts, and afterwards of carcinoma, contaminating the lymphatic glands behind the angle of the jaw and in the neck, and, finally, in this short period, rendering the bones of the orbit carious. Hence he considers it important not to neglect the opportunity of extirpating the disease in its early stage.‡ This notion of cancerous disease beginning with acute inflammation, and with the production of an excrescence, which, being at first innocent, afterwards acquires malignant characters, is totally at variance with my experience, and with the course of the disease in all the recorded instances of carcinoma, where its progress has been followed throughout.

I consider the treatment founded on it to be equally objectionable. A comparison of the cases observed by Scarpa with those which I have mentioned previously, will lead to the strong suspicion that the operations performed in the former were unnecessary; and that the disease in these cases would have come to a conclusion from the resources of nature, alone, or aided by antiphlogistic treatment.

The innocent fungous growths, which I have now described, cause changes of structure in the front of the globe, and thus destroy vision; they then come to an end. The inflammation, often very considerable, preceding and accompanying their development, sufficiently distinguishes them from the malignant growths, which I shall proceed to describe.

The cases already quoted from Sir Astley Cooper and Mr. Travers, (see pages 593, 594,) show that partial or entire extirpation of the globe may be necessary in some fungous growths, which are not malignant. The same point is illustrated by an example recorded by Mr. Wardrop, in which it is to be regretted that the exact nature of the disease was not ascertained. He says, "I have had an opportunity of seeing other diseases of this organ, at a time when my attention was not particularly directed to the investigation of the present subject, which were, perhaps, neither of the nature of fungus hæmatodes nor cancer. I am led to form this opinion from the final result of the cases; and from thinking it highly probable, from analogy, that when the eye bursts, tumors may arise from its internal parts, resembling more some kinds of polypi, than either fungus hæmatodes or cancer. There are several cases of tumors of this kind described and delineated by BEER; and, in the works of FAB. HILDANUS, there is a very accurate account of a case, which was successfully extirpated, in which a prodigious tumor grew from the eye-ball. A very remarkable case, very analogous to that given by F. HILDANUS, I had the opportunity of seeing, ten years ago, under the care of Dr. WARDROP. A gentleman, who resided in England, consulted many respectable surgeons about a very large excrescence which grew from the eye-ball; but as they supposed it to be of a cancerous nature, and as the disease had extended far, they declined making an attempt to remove the diseased parts. When he came to Edinburgh, a very large excrescence was found projecting from the orbit, and extending beyond its bony margin. As Dr. WARDROP was assured, from a careful examination of the parts, that the whole diseased mass was within the reach of the knife, and doubtful of its cancerous nature, he undertook to extirpate it. The operation was accordingly performed, and, the eye-lids being excoriated, they were also taken away along with the tumor. The parts healed in the most rapid manner, and the gentleman returned home to England in a month after the operation. A short time ago, Dr. WARDROP heard that the disease had not returned. No account was taken of this case; but Dr. WARDROP particularly remembers, that the optic nerve was found quite sound." *

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* *Lib. cit.* p. 518—521. † *Lib. cit.* p. 512. ‡ *Lib. cit.* p. 525.

SECTION III.—CARCINOMA OF THE EYE.

IF the eye-ball is susceptible of scirrhous induration and subsequent cancerous ulceration; that is, if it can undergo changes similar to those which characterise cancer of the female breast, the disease is very rare, and has not as yet

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* *Observations on Fungus Hæmatodes*, p. 88—90.

been clearly described or delineated. I have seen the globe converted into an apparently scirrhous mass, having a knotted surface, with enlarged vessels distributed over it, in which there was no trace of its natural structures. There was no material increase of size, nor was the altered globe more fixed in the orbit than in the natural state. An excavated ulcer, about as large as a shilling, had taken place, but without offensive discharge. The disease was of long standing, in a person of middle age, and did not disturb the general health. The palpebræ were free from disease, and there was no reason to suppose that the other contents of the orbit were altered in structure.

"I much suspect," says Mr. Wardrop, "whether cancer ever affects the globe of the eye in its primary form; at least, I have never met with an example of this kind. I have had repeated opportunities of observing a cancerous sore, beginning in the integuments of the eye-lid or tarsi, and spreading along the conjunctiva, till it reached the globe of the eye, the structure of which it ultimately destroyed, and contaminated the neighbouring absorbent glands; but I have never been able to obtain an accurate account of a single case, where any of the coats or contents of the eye-ball were the primary seat of cancer."*

We have no pathological materials for a history of the disease; the structure in which it begins, its progress and ultimate effects on the globe, are not known to us.

The following case, recorded by Dr. Farre, may have been carcinoma; but the exact nature of the change, which the structure of the globe had undergone, is not pointed out, either in the description or delineation, with sufficient clearness for us to determine the point, or to decide positively whether it ought not to be referred to fungus hæmatodes.

"In the year 1803, Mrs. L. gradually, and without any pain or apparent disease, lost the sight of her right eye. About two years after, she was attacked with violent pains in that eye, and in the head, on the same side; and, from this time, became subject to occasional ophthalmia. In June, 1807, the ophthalmia was extremely severe, attended with violent pain both in the head and the right eye. The cornea was considerably opaque, the iris was rather contracted, not perfectly circular, and quite immovable; though the eye was sensible to the action of light. The other eye was also, at

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* *Observations on Fungus Hæmatodes*, p. 87.

the same time, slightly inflamed. The inflammation and pain in the latter soon subsided, and were removed in the former in about a month; and no more was heard of the patient till the latter end of April, 1808. There was then a very perceptible and rapidly increasing enlargement of the contents of the orbit of the eye. The cornea had lost all its transparency, and was thickly covered with minute red vessels. The inflammation of the conjunctiva had obscured almost the whole of the sclerotica; but a distinct view of a small segment of its circumference, clearly showed the globe of the diseased eye to be smaller than that of the sound one. This circumstance, when combined with the great prominence of the diseased eye, furnished strong reason for suspecting that it was constantly pressed upon and protruded by a tumor in the interior of the orbit. In this state of the disease an operation was judged the only means of relieving the excruciating pains of the patient, which, though in some degree constant, experienced the most violent exacerbations every evening. On the 9th of January, 1809, the whole contents of the orbit were removed by Mr. SAUNDERS, with the greatest care and ability: on this occasion the os unguis was found slightly diseased. For two days after the operation the patient enjoyed perfect ease. On the third day some pains in the head returned; and though the parts healed well, were considerable, till within the last seven weeks of her life. About that time, after a sleepless night, in which she had experienced much more pain than usual, all pain suddenly left her, and she sank into a state of mental imbecility, in which she was often unable clearly to distinguish her most intimate acquaintance. The appetite was excellent, and her sleep sound, but more than natural; when awake, she was animated with such high spirits, as generally induced her to address and reply to her friends in a facetious, though not always appropriate or completely intelligible manner. This state continued till she died, on the 11th of July, 1809, in the seventy-seventh year of her age."* Figure 5, of Plate III., represents a section of the extirpated mass. The sclerotica is nearly filled with the morbid growth: it has undergone absorption at one part, near the optic nerve, and the disease, passing through this opening, has been communicated generally to the adipous membrane in which the eye is imbedded. The medulla of the nerve is discoloured at

* *A Treatise on some Practical Points, &c.* p. 150—155.

the point where it had been cut through; but it was sound between this point and the globe. *

BEER gives the following description of scirrhus and cancer affecting the eye. As he does not mention fungus hæmatodes, or melanosis, we cannot receive this account as applicable to carcinoma of the eye-ball, in the limited sense in which I have employed that designation.

"Scirrhous exophthalmia attacks the proper textures of the eye, and destroys entirely, or in greater part, their normal structure and form. It is characterised by an unequal and very hard swelling of the entire globe, which is of a reddish white colour, by a troublesome sense of weight, impaired or destroyed motion of the part, without pain or fever. Glandular swellings, in various parts, as in the neck, axilla, and breast, often accompany the complaint in the eye. A perfectly scirrhous eye-ball consists of a brownish, very firm mass, in which the proper textures of the eye-ball are lost, or at least some traces of the sclerotica only can be distinguished.

"Carcinomatous exophthalmia, which is usually developed from a preceding scirrhous change of structure, rapidly involves all the textures, to such a degree, that in a short time no trace of the original organization remains. The cases are more rare, in which this formidable degeneration of the globe, which sooner or later destroys the patient's life, commences with the development, in the conjunctiva corneæ and scleroticæ, of single, wart-like, very painful, and dark red tubercles, which have been called, by writers on ophthalmology, *papulæ*, or *carunculæ malignæ*, or *rebelles*. When carcinoma proceeds from scirrhous exophthalmia, it does not immediately break out into an open sore: acute lancinating pain is previously felt in the scirrhous eye, and extends into the head; vessels are seen on the surface of the diseased organ, and in the eye-lids, in a state of varicous enlargement; the part constantly increases in size, and becomes exquisitely sensitive to the slightest touch, while the addition to these symptoms of considerable fever, denotes the complete formation of an occult cancer. This, sooner or later, breaks out into one or more true carcinomatous ulcers, marked by the ordinary characters: the pain now becomes intolerable, experiencing only short, occasional mitigations, by spontaneous and active bleedings from the distended vessels. Such hemorrhages may be so profuse, as to cause fainting, with considerable subsequent debility; and, commonly, the fatal termination is immediately produced by an occurrence of this kind. The strength is further exhausted by the daily and hourly excessive discharge of a stinking sanies, streaked with red and green, from deeply corroding ulcerations of the eye, with hard, leaden-coloured, uneven, and everted edges, whereby the cachectic state of the constitution is aggravated, and the slow, hectic fever is kept in a state of constant progression."[*]

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* *Lib. cit.* p. 218.

The opinion of Mr. Travers will be seen from the following quotations. "I had formerly been led to suppose, that the malignant disease termed cancer, affected the ball or globe of the eye. Such is the doctrine of most writers on the subject. I have, however, satisfied myself that as regards the eye, this disease is peculiar to the lacrymal gland, conjunctiva, and eye-lids; and I have classed it accordingly."[†]—"There is a malignant fungus of the conjunctiva, for like the mucous membrane of other parts, this is sometimes the seat of carcinoma; and excepting the lacrymal gland, I believe no other texture related to the organ of vision is ever primarily so affected. I have removed the contents of the orbit for a painful tubercular fungus, with ulcerated depressions containing an ichorous discharge. The coats and humours of the eye were for the most part absorbed, the lacrymal gland scirrhous. The disease afterwards returned upon the palpebræ, and destroyed the patient. I have at this time a similar case under my observation. The fleshy tubercles grew from the conjunctiva, both on the cornea and sclerotica, and the inferior palpebra is extensively ulcerated. It is accompanied by lancinating pain in the supra-orbitar region, and an unhealthy discharge."[‡]

The appearance of the disease in the last-mentioned case is delineated in Plate II. fig. 1, which I should have supposed to represent the carcinomatous affection of the eye-lid already described. I conclude, indeed, from the further description by Mr. Travers, in the *Medico-Chirurgical Transactions*,[§] that the cancer of the eye-lids, which he represents as an affection originating in the conjunctiva, is not different from the disease in the same part, which I have found to commence in the skin. For he strongly represents one striking feature of the complaint in its advanced period, namely, the resistance of the globe to the progress of the destructive disease. "For a long time the globe remains (I have even seen the cornea and humours clear) suspended, as it were, geometrically, in the centre of the ruin." Other points of this description have not, however, been exemplified in the cases which I have seen; such are a luxuriant fungus overshooting and burying the eye; exposure of the malar and temporal bones; and an immense fungous mass encircling the orbit, and in part springing from it, everted over the supercilium, nose, temple, and cheek.

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[*] *Lehre*, vol. ii. p. 225—227.

[†] *Synopsis of the Diseases of the Eye*, p. 216.

[‡] *Ibid*, p. 100.

[§] Vol. xv. p. 234, 235.

Causes.—On this subject I may refer to the remarks already made, in reference to that point, in speaking of carcinoma of the eye-lids, and particularly in regard to its supposed origin from injuries, external irritants, common inflammation, or the consequent thickening and induration.

Treatment.—Internal remedies and external applications are of as little avail in cancer of the eye, as in other affections of similar nature. The only question is, whether extirpation can be undertaken, in an early period of the disease, with reasonable prospect of success. The operation would not be advisable, unless the affection were confined to the globe, and that were freely moveable in the socket. If the disease should have extended to the surrounding parts, and the eye should have become fixed, the operation would be unavailing; at least relapse of disease might be confidently expected. Such was the unfavourable termination of cases operated on by DESSAULT,[*] SCARPA,[†] and Mr. TRAVERS.[‡] When the eye, although altered in texture, is not much enlarged, when it is still moveable in the orbit, when the palpebræ and the absorbent glands are unaffected, and the general health is good, the removal of the diseased organ may be proposed, although we cannot guarantee the permanence of the cure. After mentioning that he had found medicines altogether useless in scirrhus of the globe, **Beer** proceeds to say, that extirpation remains as the only resource. "However," he adds, "I cannot positively promise a completely favourable result, even under the most auspicious circumstances. Knowing that this operation, although performed by excellent surgeons with the greatest care, has generally turned out unfortunately; and having experienced failure in two cases out of seven, where I had undertaken it on the clearest indications, I can place no great confidence in its essential benefit to the patient, unless a temporary relief from a change of structure, attended with great deformity, should be regarded as such."* The conclusion, in this passage, is at variance with the premises. Five cures out of seven cases, if they were permanent, constitute an encouraging result, and would justify a much stronger recommendation of the operation than could be warranted by general experience. Perhaps **Beer** may have intended to speak merely of recovery from the operation: I can hardly suppose that permanent cure would have been effected in so large a proportion of cases truly cancerous.

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[*] *Œuvres Chirurgicales*, par BICHAT, tom. ii. p. 115—117.

[†] In the preface to his first edition, SCARPA says, that he had seen only two instances of cancer of the eye. The first, in a boy of thirteen, seems to have been an example of fungus hæmatodes; "In the second, that of a man fifty years old, robust, and perfectly healthy in all other respects, the cancerous fungus included not only the globe, but also a portion of the upper eye-lid. I removed with the greatest accuracy the contents of the orbit and the upper eye-lid, cutting along the edge of the orbit, where the parts appeared perfectly healthy. Every thing proceeded very favourably till the fortieth day, and the cicatrix was advancing gradually from the margin of the orbit towards its fundus. The wound now became stationary, and, at various points, fungous growths shot up, which I endeavoured, in vain, to destroy with powdered savine and caustic. Severe pain of the head and nervous fever came on: the patient lost his senses, and died."—*Saggio di Osservazioni, &c.* Pavia. *Prefazione*, p. 9, 10.

[‡] *Synopsis*, p. 100.

If the case should have proceeded so far, that we do not think the operation advisable, we can only palliate the mischief, mitigate the pain and distress of the patient, and thus render his remnant of life more comfortable. When the suffering is considerable, we must administer narcotics, increasing the dose in proportion as the constitution becomes habituated to them. The local application of opium often gives relief, especially in the ulcerated stage, and the *liquor opii sedativus* of Mr. **Battley** is a form well suited to the purpose. We may begin with two drams to an ounce of distilled water, and gradually increase the strength, until we use at last the undiluted liquor. Lint, moistened with the fluid, may be applied to the part under a dressing or poultice. Opium may be used in the form of ointment, made by incorporating one or two drams of it, finely powdered, with an ounce of lard. The internal use of the same remedy is necessary to relieve pain. The progress of these cases is often slow: the affection may be clearly marked and completely developed, and yet continue much longer than might have been expected, without destroying life. In a patient, who used to come to the London Ophthalmic Infirmary, cancer of the globe had existed for a long time. During three or four years that I saw him occasionally, it made but little progress. We are not therefore to infer, because this disease destroys life, that it does so rapidly.

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* *Lehre*, vol, ii. p. 230.

Scirrhus of the caruncula lacrymalis and of the lacrymal gland.—I have already spoken of malignant encanthis. (See p. 364.) What I have to remark on scirrhous disease of the lacrymal gland will be found in the chapter on diseases of the lacrymal organs.

SECTION IV.—FUNGUS HÆMATODES OF THE EYE.

OF the malignant affections, incidental to the organ of vision, this is by far the most frequent; its nature, progress, and fatal termination being similar, in all essential points, to what we observe when the disease attacks other parts of the body. The globe of the eye is gradually converted into a soft texture, approaching more or less nearly, in colour, appearance, and consistence, to the substance of the brain. This adventitious growth, after distending and enlarging the globe, makes its way externally through the cornea or sclerotica, and appears as a fungus, distending the lids, or projecting between them. Ulceration and sloughing ensue, with fetid discharge, hemorrhage, and great pain; and these, with severe constitutional disturbance, soon destroy the patient. The absorbent glands are generally affected; and secondary affections, similar in character to the primary disease, are usually found after death within the cranium and in other parts.

The morbid growth, which appears first at the back of the globe, gradually comes forwards, and makes its way externally by ulceration of the cornea or sclerotica. In the first stage of the affection, the pupil exhibits a deep-seated, whitish, yellowish, amber coloured, or even greenish discolouration of brilliant appearance, causing a reflection of light, as if a metallic plate were at the back of the eye, and soon noticed even by unprofessional persons. In the very early period, this discolouration is so small, that its limits can be distinguished. We soon find that it is owing to an adventitious deposit in the eye, of which the surface is usually uneven, and sometimes exhibits vascular ramifications, which have been supposed to be those of the central vessels of the retina. At first the iris may be sluggish, and the pupil partially dilated; the latter soon becomes fully dilated and fixed. There is no change of figure in the globe, no unusual vascularity, nor any evidence of pain; but vision is destroyed. In the second stage, the diseased production increases in size, distends the globe, advances to the front of the eye, pushes the lens and iris against the cornea, and destroys the transparency of the former, which assumes a light amber colour; the tint of the iris also is more or less changed. The sclerotica is manifestly distended; it has a bluish or leaden colour, and partial bulgings are sometimes seen on its anterior part. The distention of the globe is further evidenced by enlargement of the cornea, which loses its clearness. The eye is now inflamed and painful, and sympathetic disturbance of the constitution takes place: inflammation and pain sometimes occur at an earlier period; they may be removed for a time and come on again. The appearance of the fungous growth which most strongly characterises the affection, is now lost sight of, being concealed by the opake state of the lens. "In this stage of the disease," says Mr. Wardrop, "I have known two cases which were mistaken for cataract, and in one of them an experienced surgeon attempted to couch it." * He observes further, that "in some cases a quantity of purulent matter collects between it (the adventitious growth) and the cornea."

In the third stage, the inflammation of the eye increases, with augmented vascularity, and lacrymal discharge, with redness, swelling, and vascular distention of the lids, severe pain of the eye and head, excited circulation, hot skin, restlessness and want of sleep, white tongue, thirst and loss of appetite. Having caused more or less considerable enlargement of the globe, the tumour now makes its way externally, the cornea or the sclerotica, after previous distention, giving way by absorption, with temporary relief of the local and general suffering. The escape of the crystalline lens through the cornea, just before the external appearance of the tumour, has been sometimes observed.† A soft reddish, reddish white, brownish or livid fungus now protrudes from the surface of the eye, and the organ, increasing in size, but without any trace of its normal structures, projects between the lids, if it should not have done so previously. The fungus, which is soft and easily lacerated, bleeds spontaneously or on the slightest injuries; it discharges a fetid ichor or sanies, which

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* *Observations on Fungus Hæmatodes*, p. 11.

† *Observations on Fungus Hæmatodes of the Eye*, by Mr. Middlemore—*London Med. Gazette*, vol. vi. p. 879.

excoriates the lower lid and cheek. Portions of the most prominent part slough away with increase of the discharge and fetor, the separation being often attended with profuse bleeding. Under the various combinations of ulceration, sloughing, and hemorrhage, with the presence of discharge, or blood in a fluid or dried state, the colour and external appearance of the disease may exhibit considerable varieties. It increases rapidly, soon acquiring the size of a small apple or of an orange; it may become as large as the fist, or even attain a greater magnitude.

If the fungus should burst through the sclerotica, it will distend the conjunctiva and thus acquire a mucous covering, under which it may enlarge considerably before ulceration, and the subsequent processes of sloughing and bleeding commence. It grows more slowly in this case, and sometimes distends the lids very considerably, without projecting between them.

The disease may have its origin exterior to the globe, which it partially surrounds and pushes forwards. The tumour is covered by the conjunctiva, and in the centre of its anterior prominence are seen the cornea and iris not much altered. It grows slowly, expanding and enlarging the lids, then pushing out between them, and acquiring a great magnitude without ulceration. When it is larger than the fist, the cornea and iris are still recognized of their natural size, and nearly normal structure. Mr. TRAVERS gives a coloured engraving of such an affection in an infant of eight months, in whom the disease was congenital, the eye-ball having been as large as a walnut at the time of birth, and equal to the fist when the figure was taken. He observes that "the disease in this infant, from the central position of the cornea, and from the enormous protrusion and equal figure of the ball, was supposed to be seated on the orbitar appendages. It is remarkable that the child was well nourished and apparently suffered little constitutional disturbance. The other eye was sound."*

Although it seems probable that, in the cases now alluded to, the disease is of the same nature as in those where the growth begins in the globe, the point has not yet been ascertained by dissection; nor do we know at what period, nor in what manner or degree, the proper textures of the eye may become involved in a disease which is at first foreign to them, supposing our notions on that subject to be correct.

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* *Synopsis of the Eye*, p. 205 and 410. Plate v. fig. 7.

The neighbouring lymphatic glands sometimes enlarge, and become diseased; sometimes they are unaffected. Those which I have seen diseased have been on the cheek in front of the parotid, under the lower jaw, and at the side of the neck over the large blood-vessels. They have sometimes formed tumors of considerable size. Mr. WARDROP says, "The absorbent glands become also affected during the progress of the disease; they swell and inflame, and sometimes grow to an enormous size. In some cases the swelling of the glands commences at a very early period, whilst in others they are not affected until the disease is far advanced. Most commonly those glands swell which lie in the immediate neighbourhood of the parotid gland, or lower jaw. In two cases, I found a small hardened gland close to the optic nerve; in a third case, glands were found near the nose, and on the supercilia; and, in another case, a diseased gland was found adhering to the os malæ, within the margin of the orbit."*

"I have not," says Mr. MIDDLEMORE, "often seen the superficial glands much affected; they have been in two instances slightly enlarged and tender, but it has not fallen to my lot to witness them changed into a medullary mass, or proceed to ulceration. Such an occurrence seldom takes place, and then only, as far as my observation extends, at the close of the disease."†

When the disease has reached the ulcerative stage, the child soon sinks under the profuse discharge and bleedings, the severe pain, and constitutional disturbance, and dies emaciated. Affection of the brain may come on in the latter stage and cause convulsions, more frequently it is of comatous character, and the patient dies insensible: sometimes the sight of the sound eye has been lost, either gradually or suddenly, before death. These circumstances are explained by the extension of disease through the back of the orbit into the cranium, and by the internal disease being sometimes so situated, as to press on the opposite optic nerve.

Seat and nature of the disease.—The examination of eyes affected with fungus hæmatodes, in its early period, has led to the conclusion that the disease consists in organic change of the retina, or in a growth from the retinal extremity of the optic nerve. This would account satisfactorily for the appearance, exhibited in the commencement, of an adventitious growth in the fundus of the eye.

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* *Observations on Fungus Hæmatodes,* p. 13, 14. The first plate of this work contains two figures, representing the external appearance of the disease. In one, where it had returned after extirpation of the globe, there are three glandular swellings, in front of the parotid, and below the jaw, as large as walnuts. In the other, the absorbent glands under the jaw are increased to a mass half as large as the child's head, although the original disease is not of large size. See p. 33 and 43.

† *Lib. cit.* p. 882.

Mr. SAUNDERS examined, after death, a case in which the left eye had become affected with fungus hæmatodes at the age of nine months, and the right at that of fifteen months. The child died soon after the latter period, when the left eye had become completely disorganized, but the disease on the other side was still confined to its original seat in the vitreus humor. In this eye, which is figured, both in Mr. WARDROP's *observations on the fungus hæmatodes*,[*] and in the posthumous work of Mr. SAUNDERS,[†] the optic nerve, sclerotica and choroid were sound, the latter being thin. The retina had degenerated into a soft mass of lobulated appearance, connected only to the optic nerve.

Mr. WARDROP removed the eye-ball in an infant under three years, in whom the morbid growth was still confined to the interior of the globe. A fleshy looking mass, about the size of the little finger, surrounded the optic nerve, adhering firmly to it, and to the adjacent part of the sclerotica. A section was carried through the diseased mass and the eyeball. The former and the optic nerve were now seen to be distinct: the nerve was larger and firmer than usual, and altered in colour, "after the nerve entered the sclerotic coat, nothing like retina could be distinguished, but it seemed to swell out and form a mass resembling that which surrounded it externally. This mass filled the posterior chamber in such a manner, that the choroid coat was pushed from its natural situation towards the anterior chamber, in the form of an irregular shaped bag."—"The tumor could be separated from the sclerotic coat at every part, except near the entrance of the optic nerve. There it adhered to it so firmly that it could not be dissected from it without being torn. The different parts of the mass much resembled common medullary matter, intersected in an irregular manner with cellular fibres, which rendered it rather firmer, and less easily divided than brain."[‡]

Mr. WARE extirpated the left eye of a child six years old, on account of fungus hæmatodes. The disease soon returned with glandular enlargements on the face, near the parotid, and in the neck, and the right eye began to exhibit the same affection, which, however, had not proceeded beyond its first stage, when death ensued. "The right eye did not appear to be enlarged; but on cutting through its tunics, almost the whole space, usually occupied by the vitreus humor, was found to be filled with a steatomatous substance, which in general was of a white colour, but in some few places was red and bloody. When this substance was removed, a white smooth tumor was discovered behind it, perfectly distinct from the steatomatous substance above mentioned, and appearing to be a morbid alteration of the tunica retina itself. The tunica choroides had very little of the nigrum pigmentum spread over its surface. The crystalline humour, as well as its capsule, was perfectly transparent; and the optic nerve, and every other part connected with the eye, appeared to be in a healthful state."[*]

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[*] P. 193; the case is given at p. 47.

[†] P. 145--147; Fig. 6 of Plate ii.

[‡] *Lib. cit.* p. 37; Plate ii. fig. 1.

The following description of an eye removed during the first stage of the disease is given by Mr. Mackenzie. "I have now before me an eye, extirpated by the late Dr. Monteath, during the first stage of this disease. Immediately after the operation, I divided the cornea and sclerotica by a crucial incision, and laid back the four flaps. The iris and choroid were entire. I divided them in like manner, laid them back, and along with the choroid, I found that I reflected also the retina, which, though broken, and here and there deficient, is still sufficiently entire to give a white coating to the whole internal surface of the choroid, and has evidently nothing to do in this instance with the medullary tumor, which occupies the whole space of the vitreus humor and crystalline lens, and springs from the optic nerve as from a root. The tumor, enveloped in a membrane similar to the hyaloid, was of the consistence of brain, and of a yellowish white colour. The optic nerve, exterior to the sclerotica, did not appear diseased."[†]

"The retina," says Mr. Wardrop, "becomes so completely changed, that in no instance could I detect any remains of its natural appearance; and a tumor is formed in the posterior chamber, extending from the entrance of the optic nerve forwards, in such a manner as to displace and promote an absorption of the vitreous, crystalline, and aqueus humors.*

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[*] *Remarks on the Ophthalmy, &c.*, p. 229---232.

[†] *Practical Treatise on the Diseases of the Eye*, p. 547.

Professor PANIZZA examined an eye which had been extirpated in an early period of the affection, and found an adventitious growth immediately involving the retina, although that tunic and the optic nerve were not changed in structure. The case was that of a lively, robust, intelligent infant, twenty months old, of swarthy complexion, in whom fungus hæmatodes had existed for a month in the left eye, having originated from a serious internal inflammation of short duration, following severe suffering from dentition on the corresponding side of the upper jaw. The eye was natural in size, motion, and state of vessels; the pupil excessively dilated and motionless. Behind that opening appeared a spot of pale yellow, or canary colour, divided into three tubercular eminences, with a red vessel creeping between them. It was best seen by looking laterally at the eye, when it appeared near the pupil; while to an observer placed in front it seemed in the fundus of the globe. Vision was extinct. The diseased organ was removed by Dr. DONEGANA six weeks after the beginning of the disease. The result was most favourable, and the child from that time enjoyed perfect health. The globe was perfectly natural in size and form, but rather firmer than usual: no change was observable in the optic nerve. Through the cornea, which was still transparent, the discolouration behind the pupil was visible, as before the operation. The removal of the cornea, which allowed the escape of the aqueus humor, and that of the iris, which was healthy, exposed the crystalline in its capsule, still perfectly transparent. On looking through the lens, the yellow spot seemed in the fundus of the eye; but when it was removed, we were surprised to see the diseased mass immediately behind, forming part of the excavation in which the posterior convexity of the lens is lodged. The substance was soft and elastic, and its three eminences could be separated a little by pressing with the end of a probe. In order to ascertain more exactly its origin and nature, a portion of the sclerotica and choroid was removed from the back of the eye. As soon as the latter tunic was opened, a yellow fluid escaped with some force, and the tubercular eminences became less prominent. The fluid was yellowish and glutinous; it coagulated in spirit so as to form a pale yellow homogeneous mass. The eye was now placed in spirit to prevent the further escape of this substance. After removing a portion of the sclerotica and choroid, both of which were natural, the interior of the eye seemed full of the yellow matter, which was granular, and reduced into a fine powder by rubbing between the fingers. As the retina did not come into view after removing the choroid, it seemed as if that tunic had degenerated into this yellow matter, which appeared continuous with the optic nerve at its entrance into the globe. Indeed, on lifting the nerve gently, it appeared like a cord gradually expanding into the yellow mass. On carefully removing the latter, I found in the midst of it the retina, shrunk, folded, and reduced into a conical form, extending from the entrance of the nerve to the eminences already described, which were merely prominences of the tunic caused by pressure of the yellow fluid. Hence it appeared that the yellow spot was not a change of structure in the retina, but produced by a yellow fluid collected between it and the choroid, and pushing the retina towards the middle of the eye and forwards. The vitreus humor became diminished in proportion as the morbid deposit increased, and the eye contained only a very small portion. The firm connexion of the retina to the corpus ciliare prevented the yellow fluid from entering the posterior chamber. We can thus perceive how the retina, pressed on all sides by the morbid deposit between it and the choroid, was pushed forwards, so as to form the three tubercular prominences which caused the yellow appearance in the pupil.*

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* *Lib. cit.* p. 14.

In an eye examined by Mr. WARDROP, appearances were found analogous to those described by Professor PANIZZA in the foregoing case. I have subjoined an account of the dissection, although there is some obscurity in the statement respecting the situation and connexions of the morbid growth.

CASE.—A boy, two years and eight months old, became dropsical, and died after having been twice tapped. It had been remarked some weeks previous to his decease, that there was a peculiar appearance in the left eye; the bottom of the posterior chamber having a metallic lustre produced by a yellowish opaque body. The dropsical fluid had been contained between the laminæ of the great and lesser omentum. "The optic nerve of the affected eye was found to be perfectly similar to that of the opposite side, from the thalamus till it entered the globe. The consistence or density of the sclerotica was not perceptibly altered. The choroid coat appeared rather paler than natural, and being lacerated at one small point, during the dissection, a quantity of a creamy fluid escaped. On turning back the choroid coat, the posterior chamber appeared filled with an opaque white mass, on the anterior part of which lay the crystalline lens. By immersion in spirits the retina was rendered more opaque than the new production, and was found of its natural appearance, and enveloping the diseased growth. The hyaloid membrane also surrounded the tumor, and had become opaque in a few points where the diseased production was found firmly adhering to it. This presented a mass consisting of granules or lobules, united by fine reticulated membrane. It seemed to have commenced at the point where the optic nerve pierces the sclerotic coat, at least it was connected to that point by a small pedicle, which was continuous with the larger mass attached to the hyaloid membrane, the structure of the whole being perfectly identical; viz. small granules, about the size of a millet-seed, connected together by reticulated membrane."*

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* *Sul fungo midollare dell' occhio, appendice*, Pavia, 1826. Page 9—13, tab. 1, fig. 3, 4, 5, 6, 7.

In all the cases of genuine fungus hæmatodes, which I have seen, and in all the recorded instances, which have been examined with sufficient care and accuracy to convince us that nothing had been overlooked or mistaken, except the two cases last quoted from Panizza and Mr. Wardrop, disease has been found in the optic nerve or retina, or the latter could not be traced at all, its place being supplied by the morbid growth.

The posthumous work of Mr. Saunders contains a figure representing the section of an eye removed on account of organic disease developed in the globe.† The diseased growth, which occupied nearly one half of the common seat of the vitreus humor, "seemed to be composed of a yellow coloured coagulable lymph, streaked with black, and to have originated from the inner part of the sclerotica, for the choroid coat was ascertained by dissection to quit the sclerotica, and pass on the inner side of the tumor." The exact condition of the optic nerve and retina cannot be satisfactorily ascertained either from the figure or the description. The age of the patient, (thirty-five,) and the black streaks of the morbid growth, lead to the suspicion that the case may have been melanosis.

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* *Lancet*, vol. xi. p. 87.

† Plate ii. fig. iv. p. 147---150. 207.

Mr. TRAVERS is of opinion that the origin of fungus hæmatodes is not confined to any one texture of the eye. He says " sometimes one, and sometimes another of the proper textures appears to be the matrix of the disease. The fungus, in one instance, adheres intimately to the sclerotica, and detaching the choroid and retina, throws these and the vitreus humor to the opposite side of the globe. Frequently it splits the sclerotica into two lamellæ, distinctly originating in the interstitial substance of that coat." " But in other cases, the disease unquestionably begins in the choroid, and that tunic gradually degenerates into the diseased mass, which occupying a large portion of the globe, is throughout deeply tinged with the black pigment. Sometimes the sclerotica has a morbid growth externally, and the choroid in the interior." Sometimes these tunics are only affected secondarily, the vitreus humor being the nidus of the diseased growth. " The iris and the corpus ciliare evidently degenerate in the same manner as the choroid. Again, the disease has seemed to originate at the point of entrance of the optic nerve into the globe, pushing the humors before it; and the nerve itself has upon dissection been found diseased, both contiguous to the sclerotic, and at the distance of three quarters of an inch from that tunic, where the intermediate portion has preserved its healthy aspect." " It appears to me, therefore, that this is not a disease of this or of that texture, as writers would insinuate, but of all the textures, the crystalline and cornea excepted, which yield to its progress, but never exhibit a specific change of texture."[*] Mr. TRAVERS represents that the choroid is the most strongly disposed to assume this diseased action, the retina the least so. He considers that the common nidus of the morbid deposit is the cellular structure, whether that of the adipous membrane, the common connecting tissue, or that belonging to an organ. Hence it may be deposited either on the surface or in the substance of the various tunics, or in both situations at once.[†] The varieties in colour, texture, rapidity of growth, and other characters, are referred by Mr. TRAVERS to the differences of texture in the source of the disease. " The deep blue and black tubera characterize the choroid fungus; the medullary, the substantia alba of the optic nerve or brain; a more dense fibrous brown tuber, clear of stain, is the production of the sclerotica."[‡]

[*] *Synopsis of the Diseases of the Eye*, p. 220---222.

[†] *Lib. cit*, p. 421---423.

[‡] *Ibid*. p. 222, 223.

In explanation of these opinions, it must be observed that, under the name of fungus hæmatodes, Mr. TRAVERS includes melanosis, a change of structure incidental to the adult, and differing essentially from the medullary disease of children. Also, that the dissections, from which these conclusions have been drawn, seem to have been made principally in cases of comparatively advanced disease, which were less calculated to show the primary seat of the affection, than to illustrate its rapid and destructive extension to contiguous parts.

The growth of the morbid substance alters in various ways the form and relative position of the parts within the globe, sometimes pushing forwards the choroid and vitreus humor, sometimes distending the former; sometimes destroying entirely or in great part the characteristic appearances of that tunic, and causing partial or general absorption of the vitreus humor. The sclerotica suffers the least, retaining its natural structure even when the disease has made considerable advance, and though the morbid growth may cover and closely adhere to both its surfaces. The crystalline lens is merely pushed forwards by the growth from behind. As the pressure increases, it becomes opaque, having a light brownish or amber tint. It may be found in this state, and a little flattened, on dissection of the disease before the period of ulceration; and its escape when the cornea gives way, may sometimes be observed.

In the advanced stage of the affection, the contents of the orbit, and the projecting fungus, constitute a mass of morbid substance, in which we can trace little or nothing of the normal structures. The sclerotica can still be detected; some remains of muscle may be discovered; the optic nerve may be distinguishable, or lost in the morbid structure.

The diseased production itself, as in the analogous affection of other parts, approaches in colour and consistence to the substance of the brain. It is whitish, yellowish, or reddish; firmer on the exterior, and softer, even to the consistence of cream, internally. Portions thus differing in consistence may be found in various parts of the mass. A soft creamy matter may be squeezed or scraped from the cut surface of the firmer part. Mr. WARDROP observes, that "like brain, it becomes a soft pulp when exposed for a short time to the open air, mixes readily with cold water, and dissolves in it, and it becomes firmer and harder when boiled, or when immersed in alcohol or acids. When the softer parts are washed away in water, or when the mass is forcibly compressed, the more firm and solid parts remain. These consist of a filamentous substance, resembling cellular membrane, which varies in its quantity, and in the closeness of its texture."[*]

The optic nerve exhibits various changes in size, colour, and consistence, being generally softened and even pulpy; it may be enlarged, and confounded with the surrounding diseased mass: the neurilema and inclosed medullary matter are confused together, and it is generally redder or yellower than natural.

The alteration in the nerve extends to the part within the cranium. Indeed, after passing the foramen opticum, it sometimes is lost in a mass of medullary disease developed within the skull, and pressing upon, or otherwise involving the neighbouring portions of the basis of the brain. This internal disease may extend towards the middle of the basis cranii, and press upon the united optic nerves. The thalamus nervi optici, or some contiguous part of the brain, may be diseased and pulpy, with coagula of blood intermixed.

I have seen depositions of the morbid structure in a pulpy state, of grey colour, both on the exterior and interior surface of the skull, at various points, the bony texture being rough and discoloured. A considerable growth of the same kind has been met with on the surface of the dura mater, covering the sphenoid bone behind the orbits. In a case mentioned by Mr. Wardrop, there appeared, on the external surface of the dura mater, two dark red coloured spots; and two spots similar to them were also observed in the corresponding portions of the pericranium. Between the tunica arachnoides and pia mater, there were numerous white spots, scattered in a very irregular manner over almost the whole surface of the brain, which, when cut into, were found to be small bags, or abscesses, containing a viscid white fluid like cream."[†]

When the absorbent glands are affected, the morbid change is closely analogous to that of the original affection; the texture of the gland being gradually converted into a medullary mass of pulpy or even creamy consistence. These secondary swellings, although similar in nature to the primary disease, do not ulcerate and throw out fungus. But the integuments have inflamed and sloughed from distention in some instances, where the swelling had reached an unusual magnitude.

Medullary depositions have sometimes been found in the viscera of the abdomen and thorax; particularly in the liver;

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[*] *Lib. cit.* p. 16, 17.

[†] *Lib. cit.* p. 23; see also case ii.

and I have seen the diseased substance deposited on the surface of the ribs. Our information on this subject is scanty, as this important circumstance in the pathology of the disease has been hitherto strangely neglected. The examination was confined to the eye and head in all the cases recorded by Mr. WARDROP, as well as in those mentioned by Mr. TRAVERS, and in the posthumous work of Mr. SAUNDERS.

Diagnosis.—When we consider the characteristic features of this formidable disease, namely, the formation of a soft adventitious production of white or yellow colour, within the globe, its progress by ulceration through the front of the organ, so as to form a fungus which bleeds, ulcerates, sloughs and produces a fetid discharge, there seems no probability of its being confounded with cancer, in which there is a succession of induration and ulceration, or with melanosis, in which the morbid growth is first dark livid and subsequently black.

A further ground of distinction may be drawn from the age of the patient. Cancer and melanosis attack those in the middle period of life, or persons advanced beyond that age. Fungus hæmatodes occurs in children: it has been seen as a congenital affection; it has commenced in a few months after birth, and has usually appeared in the five or six first years of life. Mr. WARDROP says, that in a list of twenty-four cases, which had come to his knowledge, twenty were under twelve years of age. It may be doubted whether the disease in the four older subjects was fungus hæmatodes, because Mr. W. does not distinguish between this affection and melanosis. Thus of the seventeen cases, either related from his own observation, or quoted from others, in his observations on fungus hæmatodes, only two were above twelve years of age. In one of these cases, (case xvi.,) the affection was obviously melanosis; and it is almost equally clear, that the other case (case xvii.) was of the same character. "I have never yet," says Mr. MIDDLEMORE, "seen fungus hæmatodes of the eye occur in an individual more than five years old."*

In the posthumous work of Mr. SAUNDERS, three cases of malignant disease affecting the eye-ball, in persons more or less advanced in years, are related. In an unmarried lady thirty-five years of age, disease began with loss of vision and slight dilatation of the pupil in the middle of August, 1809. On the 15th September, a tawny substance, covered with a vascular plexus, was observed behind the pupil, and the eye was extirpated on the 21st. The cavity of the globe was half filled with a morbid growth, of which the consistence and origin are not clearly described. "It seemed to be composed of a yellow coloured coagulable lymph streaked with black, and to have originated from the inner part of the sclerotica, for the choroid coat was ascertained, by dissection, to quit the sclerotica and pass on the inner side of the tumor." In this patient, who was supposed to have recovered, unpleasant symptoms subsequently occurred, and the following particulars of her state were noted on the 26th of February, 1811. "Frequent giddiness; pain of the head shooting into the left orbit, from which there is a considerable discharge; a tumor on the eye-lid, several tumors in the breast, three on one side of the abdomen and one on the other, one at the scrobiculus cordis, and another at the bend of the elbow; shortness of breath, cough, great pain in the right kidney."[*] The origin of the affection in the interior of the globe, its first appearance behind the pupil, its rapid growth, and the subsequent formation of secondary tumors in various situations, prove this to have been fungus hæmatodes.

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* *London Medical Gazette*, vol. vi. p. 880.

In another case, which I have already quoted, (see page 598,) where disease commenced at the age of seventy-one, and six years before the globe was extirpated, I consider that the disease was not fungus hæmatodes. The details of a third case, in which disease commenced at the age of sixty-six, and ended fatally at seventy-four, are too scanty to enable us to form any satisfactory conclusion respecting the exact nature of the affection.[†] The external appearance is shown in plate iii., which exhibits an enormous red fungous mass, with tubercular prominences and fissures, projecting between the lids.

A deep-seated yellow shining opacity, which is sometimes seen in the pupil, after the internal inflammation consequent on penetrating wounds of the globe, cannot be distinguished by its appearance from the medullary fungus in the same situation. A boy, about ten years old, came under my care at St. Bartholomew's Hospital, a year ago, in consequence of a wound in the eye received three or four days previously, for which nothing had been done. The point of a table fork, which had been thrown at him by his sister, had passed through the upper eye-lid and the cornea. The eye was inflamed and painful, and the pupil was occupied by a thin greyish film, which I supposed, on the first cursory inspection, to be opacity of the lens caused by the accident. The use of leeches and other antiphlogistic measures lessened the inflammation and removed the opacity from the pupil. The inflammation however recurred, and soon after a bright yellow appearance was seen, which gradually extended over the whole fundus of the globe. The iris was changed in colour, the pupil fixed in the middle state and clear; vision extinct. In a short time, the globe felt soft and began to shrink, and atrophy was considerably advanced, when the lens became opaque and completely concealed the change in the back of the eye; the globe became completely atrophic.

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[*] *Treatise on some practical points*, &c. p. 147—150. 217. The appearance of the pupil before the operation, and a section of the globe after its extirpation, are represented in plate ii. fig. 3 and 4.

[†] *Lib. cit.* p. 153.

"A young lady," says Mr. TRAVERS, "was brought to town from Northamptonshire, in whom it was so strongly marked, viz. the fawn-coloured resplendent surface with red vessels arberescent upon it, that I should certainly have considered it the nascent malignant disease, but for the circumstance of its having followed a wound with a pair of fine scissors a fortnight before. The instrument had passed between the margin of the iris and the ciliary body obliquely. Deep-seated inflammation ensued, and blindness, after three days, became complete. The lens remained transparent, so as to permit this observation of the appearances described for months. At length a cataract with a constricted pupil ensued upon the chronic inflammation of the iris, and the eye-ball, which had never enlarged, gradually shrunk."*.

The origin of the affection in a serious injury, the preceding and accompanying inflammation, the circumstances of the globe never being enlarged and soon passing into the opposite state of atrophic diminution, will sufficiently distinguish this bright yellow discolouration, which is probably caused by effusion of lymph the consequence of inflammation, from the change in the pupil caused by fungus hæmatodes.

Mr. TRAVERS met with a case, in which the vitreus humor had lost its transparency, and acquired a firm consistence like that of ground rice boiled. There was at first a bright discolouration in the back of the globe, like that of incipient medullary fungus. The lens then became opaque, and was protruded against the cornea, forcibly dilating the pupil; the anterior part of the globe had at this time a conoidal figure. In this patient, a fine infant eight months old, the disease was supposed to be the malignant fungus in its nascent state, and the eye was extirpated. The tunics were all sound, and no other change was observed except that above mentioned in the vitreus humor. When Mr. Travers published his synopsis, the child had grown to be a fine healthy boy, and the other eye remained sound.[*] We want materials for illustrating the nature, diagnosis, and termination of this disease, of which the case above mentioned is the only recorded instance.

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* *Medico-chirurgical Transactions*, vol. xv. p. 237.

In other cases, where the nature and seat of the affection has not been ascertained, a brilliant discolouration has been seen in the back of the globe, and the disease has been considered fungus hæmatodes. The affection after some time has become stationary; the eye has not inflamed or enlarged as in fungus hæmatodes, nor has the crystalline become opaque or been protruded; on the contrary, atrophy has taken place. Examples of this kind came under my observation at the London Ophthalmic Infirmary; and Mr. Travers communicates his experience on the same subject in the following passage. "I have since seen several cases of a convex? and permanently dilated pupil, with a deep-seated opacity of a splendid yellow tint in children, and doubting from the preceding history, and the child's freedom from indisposition, that such appearances indicated a malignant disease, I have abstained from operating. To my surprise, the appearances have continued stationary for years, unaccompanied with any disorder of the health. One, a child of four years old, I have very recently examined, having seen it at intervals during that period, since the first notice of the disease at the age of three months. I can discover no difference in the appearance of the eye at this time, from that which it then assumed. The bright yellow tint occupies the temporal hemisphere of the globe, supposing it were bisected in a vertical direction; the figure of the globe is slightly conoidal, the pupil much dilated as if from pressure, not perfectly circular, and its edge apparently everted, forming a narrow white line, while small detached flakes of the pigment lie behind it next the lens. The pupil of the other eye is constricted, and closed by an opaque capsule. The child is well grown and in perfect health."[†]

On another occasion,[‡] Mr. Travers observes, in reference to the same subject, that "the peculiar metallo-lustrous or tapetum-like appearance of the fungus of the eye is not diagnostic: this is a fact highly important to be known. I have seen several cases, in which that appearance was stationary, and the eye-ball dwindled, which might therefore fairly be presumed not to have been instances of malignant disease. It so happened, however, that long alterative courses of mercury, or protracted salivations, had been used in these cases, and the fact was consequently open to another explanation, viz. that they were examples of malignant disease, which had been arrested by this treatment. That the appearance I allude to is very analogous to that of the medullary tumor, will be inferred, when I inform the society that, (in the case of a lady who several years since recovered with the loss of sight, but is still in perfect health,) at a consultation, including some eminent members of the profession, the extirpation of the organ was overruled by one dissentient, although I had sat down to perform it on two several occasions."

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[*] *Lib. cit.* p. 202, 203; and plate iii. fig. 7.

[†] *Lib. cit.* p. 203, 204.

[‡] *Medico-chirurgical Transactions*, vol. xv. p. 235, 236.

We cannot hitherto establish the diagnosis between the affection now described, and fungus hæmatodes in its early stage. The stationary condition of the former, with the absence of enlargement and inflammation of the globe, will sufficiently distinguish it from the malignant disease in its second period.

The opaque substance growing in the situation of the vitreous humor in the medullary disease, presents an appearance so totally different from the simple discolouration of the very back of the globe in the amaurotic cats' eye, and from the slight semi-transparent greenish and grayish appearance behind the pupil in glaucoma, which is lost sight of in looking at the eye laterally, that the disorders could not be confounded, even if the ages at which they respectively occur did not sufficiently distinguish them.

The colour and situation of the opacity distinguish cataract from fungus hæmatodes. When opacity of the lens supervenes on the latter affection, the nature of the case is clearly pointed out by the preceding development of the fungous growth behind the lens, by the protrusion of the latter, with the iris, against the cornea, by the concomitant inflammation, and by the dull yellowish or amber tint of the part, which forms a strong contrast to the pure white of simple cataract in children.

Treatment.—This disease is as intractable as cancer, and equally, or rather more, destructive. External and internal remedies may relieve particular symptoms and palliate suffering, but they cannot check the progress of the disorder, which proceeds, in spite of any treatment hitherto pointed out, to the destruction of the organ, and ultimately of life itself.

The practical question of principal importance is whether extirpation of the globe is advisable; and at what period it may be undertaken with a reasonable prospect of success. Our present experience is very discouraging, and leads to the inference that the operation, even in an early period, is unavailing.

Mr. Wardrop extirpated the globe in an infant twenty-seven months old, in whom the disease had begun at the age of twenty months, and had not, at the time of operating, made its way through the front of the eye. The optic nerve was surrounded by a mass of disease, which was divided with the nerve in the operation: the part left behind could be felt passing into the foramen opticum. The child died in twenty-five days with symptoms of diseased brain, and reproduction of disease in the orbit; the sight of the opposite eye having become imperfect a few days before death. Small deposits of soft matter were found on both surfaces of the cranium, and under the arachnoid coat. From the diseased mass filling the orbit, the optic nerve proceeded through the optic foramen, and then was lost in a medullary tumor as large as a hen's egg, extending into the brain towards the thalamus nervi optici of the affected side, from which it was separated by a cavity containing black blood.*

"In all those cases," says Mr. Wardrop, in which I have removed the eyeball, and in those, the history of which I have been able to learn, where the operation has been resorted to, it has been attended with the same unfortunate failure, excepting in one doubtful case—[an example probably of melanosis]; and even in this, as only ten months have elapsed since it was performed, we cannot speak of its effects with certainty." He adds; "but as we know of no instance of the operation being performed at a very early period of the disease, or in any case where the optic nerve was found in a healthy state, there is still room to hope for success under such circumstances. It is an experiment, at all events, which well merits trial; and were I in any case to be assured of the existence of the disease in the early stage, I would have no hesitation in urging the performance of the operation. Past experience proves the impropriety of attempting any operation, when the disease has advanced so far that the posterior chamber is filled with the diseased growth. An operation at this period has, in many instances, alleviated the patient's sufferings, but I have no hesitation in saying, that it has, also, in many cases, hastened the patient's death."[*]

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* *Lib. cit.* case ii. p. 35—40. The appearance of the extirpated eye (which has been already described at page 608) is represented in plate ii. fig. 1; and that of the united orbital and cranial tumors, in a figure inserted in page 40.

In the following passage, Mr. TRAVERS bears a similar testimony, from his own experience, to the constant failure of the operation. "I have extirpated the eye affected with medullary cancer in several instances; but I am not acquainted with any case in which the patient, who has survived two years, has not been revisited by the disease."[†]

In the nineteenth volume of the *Edinburgh Medical and Surgical Journal*, Mr. WISHART has published a *case of fungus hæmatodes of the eye-ball, cured by extirpation of the eye.*[‡] The patient, a boy nine years old, was seen by Mr. W. on the 12th of May, 1821. The left eye was dull, and presented a general turbid appearance: the cornea was transparent, but numerous vessels passed into it over the sclerotica. The pupil was moderately dilated and fixed; its margin slightly serrated. In the posterior chamber an opacity was observed, resembling a yellow dusky membrane, lining the whole posterior part of the eye-ball, and perceived more distinctly when the eye was viewed laterally. Vision was nearly extinct; lacrymation and pain were produced by exposure to light; and there was occasional shooting pain in the upper edge of the orbit. The pulse was natural and the general health good. Two months previously a blow had been received on the eye. He felt no uneasiness the same afternoon, but great pain came on the next morning, and vision was almost entirely lost. The effects of the injury were apparently removed by antiphlogistic treatment, and he returned to school. About the 10th of May the eye again became inflamed and painful: leeches were twice applied; opening medicine was administered, and afterwards a grain of calomel night and morning. 19th of May: The mouth is considerably affected. The red vessels are large and numerous, especially at the upper part of the eye-ball. Pain has been experienced in the eye and orbit: there is slight effusion of fluid in the anterior chamber. 13th of June: The pupil is smaller, and its edge more irregular. The opaque substance has advanced close to the iris, which is nearly in contact with the cornea. The intolerance of light continues, but pain is gone, and the health is good. 3rd July: The inflammation, intolerance of light, and pain are increased; and febrile symptoms have come on. Blood was taken by venesection and leeches, and aperients were administered. 9th of July: The inflammation is less, but the disease increases. The iris is in contact with the cornea, and the pupil completely closed by the opaque matter. The removal of the globe, which had been previously determined on, was performed this day. The recovery was rapid and favourable, and the patient continued perfectly well at the end of eighteen months. The appearance presented in a section of the globe is said to have been precisely similar to that delineated in a figure of Mr. Wardrop's work (p. 193). "The origin of the disease in the retina was finely and satisfactorily illustrated. The optic nerve was quite healthy. The sclerotica and choroid coats were of natural texture. The cornea was a little softer than natural, and not perfectly transparent. The lens was pushed into contact with it, and seemed smaller than natural, and flattened. The diseased mass, into which the retina had been converted, connected only to the optic nerve, floated loosely in various folds, occupying both chambers of the eye. The eye-ball did not appear to be at all enlarged."

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[*] *Lib. cit.* p. 90—92.

[†] *Medico-chirurgical Transactions*, vol. xv. p. 239.

[‡] Article vii. p. 51—55.

When the result of a single case seems to contradict the uniform tenor of experience in all other instances, we naturally examine the details very closely, to ascertain whether the exception is real or only apparent. If the narrative of Mr. Wishart be thus scrutinized, a doubt arises whether the disease described by him was fungus hæmatodes, and the want of a precise description of the morbid appearances leaves us in the dark on this subject. In its origin from the violent inflammation consequent on injury, and in the circumstance of the globe not having been enlarged, the case is more analogous to those instances of brilliant deep-seated discolouration following serious accidents, than to the unequivocal examples of the medullary fungus.

Professor Panizza has recorded a case in which the eye was removed at a very early period of the disease; he says, that the success was perfect, (see page 610.) The operation was performed in December, 1822, and his work bears the date of 1826. He gives no particulars; not even mentioning whether the child was alive when he wrote. The state of parts, found on examination of this eye, was so different from what has been noticed in any other instance, that a doubt may be entertained whether the disease was fungus hæmatodes.

Our present experience warrants the conclusion, that the operation of extirpation would not be justifiable except in a very early period of the affection; and that its result even then would be doubtful.

Mr. MIDDLEMORE considers the disease to be an affection of the retina, confined in the first instance to that tunic, and strictly local: he therefore recommends removal of those parts only which are implicated in the mischief, as soon as the disease is detected, observing that they cannot be removed too soon. He states that "Mr. WARDROP has recommended the excision of the entire organ, as being most likely to ensure the patient's safety, on the presumption, probably, that a portion of the optic nerve ought to be removed as well as the retina; an operation so painful and so hazardous to the patient, (at that period of life, at least, when, to render it at all useful, it must be performed,) and so revolting to the feelings of friends, is not likely to be permitted; and as so extensive a removal of parts is, in many instances, unnecessary, I have thought it advisable to recommend merely a section of the cornea, (rather larger than that usually made in the operation of extraction,) and the evacuation of the humors, and the choroid and the retina; or, if the fungus be large and the cornea be small, the whole of it, (that is, the cornea,) and a portion of the surrounding sclerotica, may be taken away; an operation so little painful, and not at all dangerous, and by a skilful surgeon so easily performed, that it would require, in the majority of instances, very little rhetoric to recommend it to the majority of parents, who would at once refuse to allow the extirpation of the entire organ. It is only necessary to state to them that it will be less painful, dangerous, and disfiguring to their infant, than the continuance of the disease, to obtain generally their consent to the performance of an operation, which, at the outset of the malady, has all the advantages without the horrors of that usually had recourse to; and, if performed at a later period, does not preclude the extirpation of the eye-ball, if that measure be deemed necessary." *

It remains for future experience to decide on the merits of this proposal, which had not been reduced to practice at the time of its publication, and has not, so far as I know, been

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* *Observations on fungus hæmatodes of the eye.* London Medical Gazette, vol. vi, p. 914.

tried since. One objection to it is, that in some cases of the disease, the morbid growth has been found exterior to the globe, as well as within its cavity, even in an early period, and that the optic nerve has been found diseased, even in incipient cases. Again, in operations on malignant diseases, it is an imperative rule to remove not only all the altered structures, but some of the surrounding healthy parts; unless this is satisfactorily accomplished, the patient has not a chance of safety. How can we feel satisfied on this important point in such a mode of proceeding?

The bare proposal of cutting out the eye is repugnant and almost revolting to the feelings of the surgeon and the patients' friends; and we could not think of subjecting a child to this frightful operation unless compelled by necessity, and encouraged by the certain prospect of benefit; unless fully convinced that the painful mutilation will not only remove or prevent suffering, but be effectual in preserving life.

The operation is not, however, dangerous according to my experience. On the other hand, to cut away the front of the globe, and scoop out its contents, does not appear to me so completely free from all risk of unpleasant consequences, so slight and unobjectionable a proceeding as Mr. Middlemore represents.

The strong objections to an operation in cases of fungus hæmatodes, are, the circumstance of its having failed to save life in most, if not all, the instances in which it has been performed, and the spontaneous recovery of many patients, in whom the eye has presented appearances not distinguishable from those of fungus hæmatodes. (See page 617 to 620.) We are not, perhaps, warranted in concluding that an operation is hopeless in all cases of fungus hæmatodes affecting the eyeball; it would, however, be justifiable only in a very early period of the affection. Complete removal of the orbital contents seems to me the only proceeding that offers even a chance of permanent cure, while, in respect to pain and other immediate results, as well as to danger, it is not much more objectionable than the minor operation.

Mr. Travers recommends a surgical proceeding in order to discover the nature of the affection, in cases where that may be doubtful. Speaking of fungus hæmatodes, he says, "deep-seated disorganizing inflammation is very liable to be mistaken for this disease. The deep transverse section of the globe from the outer to the inner canthus, so as completely to evacuate its contents, and sink the enlarged eye-ball, is an efficient remedy in this case, which is one attended with great disfigurement from protrusion, excessive vascularity of the conjunctiva, and agonizing sympathetic hemicrania on the same side with the diseased eye. In the medullary cancer this proceeding is of no avail. But, if a doubt of the nature of the case exist, it should be practised. In the malignant disease the globe remains firm, and the section is followed by a small discharge of blood and black pigment or coagula stained with it; but if a discoloured fluid escapes, and the globe collapses, the disease is not malignant, and the cure is complete."* I consider this proceeding altogether unnecessary. In suppuration of the globe, which I never saw in a child, and which can never be confounded with fungus hæmatodes, relief may be afforded by opening the cornea; but where can matter be confined, to require for its evacuation a section of "the cornea, iris, ciliary ring, and some extent of the sclerotica?"† The cases of deep-seated discolouration in the pupil, resembling that caused by fungus hæmatodes, are not attended with excessive vascularity, protrusion, or disfigurement; while the latter assemblage of circumstances would not require that deep incision which Mr. TRAVERS recommends so freely.

If the result of experience, and the other considerations now explained, should lead us to think the operation unadvisable in cases of fungus hæmatodes, we must be contented with palliative measures. Occasional attacks of inflammation may require leeches, lotions, fomentations, and other antiphlogistic treatment. In the stage of ulceration, narcotics, especially opium, will be required both internally and externally. For the latter purpose, the liquor opii sedativus, diluted or otherwise, has appeared to me the most advantageous. I have found it completely effectual in controlling the severe pain attendant on the sloughing and ulceration of the fungous stage. For correcting the fetor, which is often very offensive, the chlorides may be used in the form of lotion, but not in immediate contact with the ulcerated surface.

In cases, where the nature of the disease is uncertain, where we doubt whether it is fungus hæmatodes or an internal affection of innocent character, a trial of mercury will be advisable, in addition to such other means, as the local or general symptoms may require.

A few cases are subjoined, to illustrate practically the symptoms, progress, effects, and character of the disorder.

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* *Medico-chirurgical transactions*, vol. xv. p. 239.

† *Synopsis of the diseases of the eye*, p. 306.

CASE I. *Fungus hæmatodes in an infant of one month.*—"JAMES TAYLOR, one month old, a fine healthy-looking child of robust parents, has a peculiar shining appearance of the right eye, which I noticed whilst examining the eyes, in consequence of an attack of purulent ophthalmia: on viewing it attentively, it seemed to be situated at the bottom of the eye, to occupy only a small space, and to yield an extremely brilliant appearance; the iris was sluggish in its action, and the pupil rather large; but the sclerotica was not discoloured, nor was the eye-ball at all altered in figure. The mother of the infant said she had had many children before, all of whom were healthy, and that her baby only wanted my advice for the running of the eyes; and certainly, judging from appearances, no child could be in better health, (with the exception of the ophthalmia,) or in possession of a stronger constitution. I could not convince the woman of the importance of her child's disease, and the propriety of a trifling operation for its removal, and she accordingly left me under the belief that I wished to make her child the subject of some extraordinary experiment." In the course of a fortnight the child died of small-pox, and was not examined.*

As the operation alluded to is that described at page 624, consisting in a large opening of the cornea, or its entire removal with part of the sclerotica, and the subsequent scooping out of the contents of the globe, it may not be thought by every one so trifling as it seems to Mr. MIDDLEMORE. To me it appears a very serious proceeding, and one of doubtful propriety. As it has not yet been tried, its employment in any case may not improperly be called experimental. The refusal of the proposition by the parent, in the foregoing case, does not seem to me to have been altogether unreasonable.

CASE II. *Fungus hæmatodes of the right eye, with tumours of the scalp and temple, and protrusion of the left eye. Extensive medullary deposit between the bone and dura mater at the base of the skull; disease of the ribs, liver, kidnies, and mesenteric glands.*—"WILLIAM FOREMAN, six months old, has several small slightly elastic tumours beneath the scalp, unattended with cutaneous discolouration; considerable enlargement at the front and upper part of each temple, and protrusion of each eye-ball. The child is generally drowsy, and becomes quite comatose when the temporal tumours are compressed. On examining the eyes, that on the left side appeared healthy, although evidently pushed forwards by some substance behind it; the pupil of the right eye was exceedingly large, the iris inactive, and the crystalline lens slightly opaque, and pressed against the neural [concave] surface of the cornea by a yellow shining substance, of a rugged uneven appearance; the sclerotica was generally of a dark-brown colour, and irregularly enlarged; the cornea attenuated, and so extended as to appear twice the size of that in the opposite organ. The mother says that her former children were quite healthy, and that the patient in question was also a fine strong child for many weeks after its birth; she does not remember that the infant has received any blow on the eye, but had remarked a peculiarity of appearance, as if something bright was in the eye, (occasioned, as she thought, by the sun,) before it enlarged, and long before the appearance of the swellings about the head; she further stated, that when four months old, it had a fit in the night, and since that time has been getting gradually more drowsy, the eyes have been protruding, and the tumours of the scalp have been increasing in size, being prior to that period so small as almost to escape notice. In a few days the attenuated cornea gave way, allowing the evacuation of the lens, (which was slightly diminished in size, and somewhat opaque,) and the protrusion of a soft red fungus, which occasionally bled. Although the patient's sufferings were by this means slightly relieved, the irritation and discharge, joined to the occasional hemorrhage, quickly exhausted its vital energies."

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* *Observations on fungus hæmatodes of the eye*, by R. MIDDLEMORE. *London Medical Gazette*, vol. vi. p. 878.

After death, nodules of medullary structure, somewhat firmer than brain, white and homogeneous throughout, were found, connected by cellular membrane to the pericranium. "At the back of the orbit on each side, and covered by, or rather external to, the dura mater, was a reddish medullary mass, in some places of a deep-red colour, surrounded by an irregularly formed circle of a fainter appearance; the orbitar plate of the frontal bone was partially absorbed, and the remainder of it altered, as though partaking of the same morbid character as the surrounding parts. The bulk of the tumour in each orbit was about the size of a very small orange, connected by a transverse portion of the same diseased structure, which extended backwards, still covered by the dura mater, (which was raised from the bones,) as far as the anterior clinoid processes; and on the right side to the petrous portion of the temporal bone. I could discover no trace of the optic nerve of the right side, except where it was united to the sclerotica; it was then a soft and reddish mass, at the ocular extremity of which was a similar substance, slightly altered by incipient mortification. The sclerotic coat appeared healthy, but the major part of its contents had sloughed away a few days before; indeed no part of the eye-ball remained, with the exception of the ruptured and attenuated cornea, the sclerotica in many places thin and sacculated, and the medullary and partially mortified mass attached to the extremity of the optic nerve.

"The heart, lungs, and pleura were healthy; many of the ribs on each side, as far as their cartilages, were red and swoln, and when cut into were found soft and pulpy, evidently approaching to the state of medullary change, which has just been described as affecting the interior of the eye-ball and the bones of the orbit.

"The liver was enlarged, and converted in many places into a medullary mass of a pale red colour; both kidnies had undergone the same kind of alteration, and were greatly enlarged; the mesenteric glands, although somewhat augmented in size, had not experienced much change of structure; the other viscera were moderately healthy."[*]

CASE III. *Fungus hæmatodes of the left eye in a child three years old. Extirpation of the eye and return of disease —the united portion of the optic nerves converted into a medullary tumour.*—A female child, three years old, was said to have received a blow on the eye a fortnight before Mr. WARDROP saw her; but the eye had previously appeared sore and painful. "On examining the eye," says Mr. WARDROP, "it was slightly inflamed, and had the peculiar expression of a blind eye. But what appeared remarkable was, that the pupil was much dilated, and that behind it, and at the very bottom of the posterior chamber, there was a tawny, yellow-coloured, flaky-looking mass, the surface of which was unequal, and formed into folds, and a large blood-vessel, which I supposed to be the central artery of the retina, was seen running across the pupil. The anterior chamber had lost its natural transparency, apparently from the aqueous humour being slightly tinged with blood." The eye was inflamed and painful. At the end of eight months, the new growth in the eye had moved forwards, so as to be on the same plane with the iris; it appeared like a layer of lymph. The eye-ball was irregularly swollen, the sclerotic dark-blue, and the pupil excessively dilated. In five or six months more, the globe was so swelled that the eye-lid could not cover it; the boundary between the cornea and sclerotica was no longer visible; a small spot of purulent matter was observed behind the cornea, which ulcerated, and in a few days a small tumour rose out from the ulceration, which bled freely. The globe was now extirpated.

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[*] Mr. MIDDLEMORE, *lib. cit.* p. 879.

The whole anterior chamber was destroyed, and occupied by a soft fungous mass, having no defined structure. The optic nerve was enlarged, firmer and darker than usual, and showed no distinction between neurilema and medullary fibres. The sclerotica was unaltered, and separated readily from the choroid; the latter was unusually red, and could not be separated from the retina; it adhered firmly to a solid substance, on the surface of which nothing like nervous expansion could be detected. On making a vertical section of the globe, the posterior chamber was found to be completely filled with a solid mass, having the general appearance of brain. Some parts were pulpy, and easily washed away in water, leaving behind a filamentous substance, like loose cellular membrane. On tearing the mass, some parts were much harder and firmer than others, and at one point there were many gritty particles. The portion of the tumour occupying the posterior chamber had very much the character of medullary matter; but the anterior portion forming the external fungus, was as soft as jelly.

The case went on favourably; but in six weeks, the lids began to be elevated, and pain occurred in the orbit. The swelling gradually increased, produced by a morbid growth in the cavity, which soon projected beyond the palpebræ. A glandular swelling now appeared on the cheek, in front of the ear, and two smaller ones under the lower jaw. These swellings, and the orbital tumour gradually increased, the general health failed, and death ensued about six months after the operation, having been preceded by a state of stupor.

The lateral ventricles contained between four and five ounces of transparent colourless fluid. The optic thalami were natural. At the union of the optic nerves in front of the sella Turcica, a tumour was formed as large as a chestnut. It was nearly globular, more yellow than common medullary substance, a little unequal, but smooth. On removing a delicate transparent membrane, which surrounded the tumour, it was found to consist of a white pulpy matter. It soon became softer on exposure to air, and was readily dissolved in water. Nothing resembling nerve could be found in it;

although the optic nerves were seen entering it at one extremity, and passing out at the other, to go into the foramina optica. Where the nerve of the left side had been divided, in removing the brain, a similar matter issued from the divided extremity. The contents of the orbit were a mass of diseased structure containing portions of blood and round masses of soft matter like that of the tumour in the sella Turcica. The glandular swelling contained pulpy matter exactly similar to that of the tumour within the skull.*

Case IV. *Fungus hæmatodes of the eye in an infant; operation of extirpation; relapse of disease and death; various morbid changes in the brain and membranes.*—In this case, which was that of a child twenty months old, the progress and symptoms nearly resembled those of Case III. There was the same brown or yellowish colour observed in the bottom of the posterior chamber, with great dilatation of the pupil. The disease had existed seven months before the globe underwent change of figure. At last, however, it enlarged so that the eye-lids could hardly cover it; the conjunctiva became inflamed, and the opaque body approached very close to the cornea, having the same deep yellow tinge as when it was first observed. At this time the operation was performed. In removing the ball a firm mass was cut through adhering to the optic nerve; and a continuation of it could be felt with the finger passing through the optic foramen. The dissection of the eye-ball is described at page 608.

In ten days violent convulsions occurred, but did not return. A few days after, the formation of a tumour in the orbit was apparent. Twenty-five days after the operation, death ensued, having been preceded by symptoms of violent cerebral disorder. Some days before death, the vision of the left or sound eye became indistinct. On the external surface of the cranium, there were several circular white spots, and two of deep red with the bone rough, the pericranium thickened and easily separable. In the dura mater and arachnoid there were morbid depositions, described at page 615. On removing some of the cerebral substance contiguous to the thalamus of the right optic nerve, a cavity was brought into view, containing a considerable quantity of black blood, and a tumour could be felt in this cavity, composed of a firm substance, about the bulk of a hen's egg, the upper surface of which formed the bottom of the cavity. As this tumour was firmly connected to that in the orbits, the parts were removed in one mass, and then divided by a perpendicular section. The cerebral and orbital tumours were connected by the optic nerve. The posterior part of the former was soft, and resembled common brain, but the rest consisted of a reddish vascular mass of firm consistence, very much like liver in appearance. Nothing like nerve could be distinguished in any part of the mass, until it approached the optic foramen, at which point there was an indistinct appearance of nervous structure. The portion of nerve, contained in the bony canal, seemed to have been prevented from enlarging by the confinement of the bone. The tumour in the orbit resembled the firmer portion of the other.*

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* Mr. Wardrop's *observations on fungus hæmatodes*, p. 30--35. Plate i. fig. 2, and plate ii. fig. 3.

CASE V. *Fungus hæmatodes of the left eye; secondary disease of the brain, ribs, and liver.*—A boy, six or seven years of age, was under my care at the London Ophthalmic Infirmary for an affection of the left eye, attended with a bright yellow appearance behind the iris, dilated and fixed pupil, loss of vision, and intolerance of light. After some time the crystalline lens lost its transparency, and the yellow growth was concealed; the vessels of the conjunctiva and sclerotica became turgid. The globe soon enlarged and distended the lids; the cornea then ulcerated, and gave issue to a bleeding fungus, which increased rapidly and soon projected between the eye-lids. Partial sloughings occurred with copious discharge of fetid ichor. In the early stage there was little suffering: severe pain was experienced, with irritability and impaired health, before the cornea gave way; and these symptoms were much aggravated in the ulcerative stage, when ease could only be procured by covering the fungous growth with a lotion of the liquor opii sedativus. The pain was completely controlled by this remedy, and regularly recurred within a certain time, if the application was not renewed. Febrile symptoms with delirium came on three weeks before death, and it was found that the child could not see with the right eye. The cerebral disturbance increased, and death occurred at last rather suddenly. The fatal termination took place in a few weeks after the appearance of the fungus.

The arachnoid and pia mater were somewhat thickened by serous infiltration: the substance of the brain was soft;

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* WARDROP, *lib. cit.* p. 35—40. Plate ii. fig. 1. The cerebral and orbital tumours are represented in a small engraving inserted in page 40.

and the lateral ventricles contained more than four ounces of fluid.

The fungus and the orbital contents formed one mass of medullary structure, in which nothing could be seen of the normal parts except a trace of one or two muscles, the sclerotica, and the optic nerve. The latter was enlarged and converted into medullary texture. The enlargement increased as it proceeded towards the thalamus. The thalami, corpora striata, pons Varolii, and adjacent parts, were so softened by medullary degeneration, that no detailed description of them can be given. The right optic nerve was not diseased; it was quite distinct from the left. The membranes at the basis of the brain were inflamed, with partial purulent infiltration.

The absorbent glands, in the course of the internal mammary vessels, on both sides, were enlarged and converted into medullary texture.

The pleura lining the fourth, fifth, and sixth true ribs on the right side was thickened, highly vascular, and raised into a small swelling, which was found to consist of a reddish grey soft medullary deposit. This growth, arising from the substance of the rib, which was much diminished, had made its way through the periosteum. The interior of the other ribs was unnaturally red. The liver was of a pale yellow colour; the other viscera were healthy.

Case VI. *Fungus hæmatodes of the right eye, with extensive disease of the brain.*—A boy, born of unhealthy parents, (the father being advanced in years, with unsound viscera, and occasionally suffering from fever; the mother scrofulous and cachectic) was slender, but reached the age of six without much illness. In the summer of 1818 he had considerable external ophthalmia with head-ache. Weakness of sight, redness of the conjunctiva, and dilatation of the pupil remained in the right eye after this attack. The head-ache increased, his strength diminished, and he passed the winter with gradual loss of flesh, diminution of sight in the right eye, and dilatation of the pupil, behind which an opacity was observed. The motions of the globe became impaired, and squinting took place. A surgeon, who saw him in the spring, pronounced the case to be cataract. Pain in the head was still severe; vision became more imperfect and was entirely lost in August. Imperfection of sight began to be observed in the left eye, which appeared quite healthy; this affection increased, and sight was lost by Christmas. The right eye now began to enlarge and project; it became knotted on the surface, and the cornea was rendered opaque, so as to conceal the progress of the internal changes. Feverish symptoms came on with further loss of strength: the boy gradually became taciturn, stupid, and sleepy, and represented, when questioned on the subject, that his pain was seated in the head, not in the eye. The latter in the mean time enlarged, and the palpebræ became everted by the swelling of the conjunctiva. Early in February, the cornea, which had been prominent and opake, gave way, with a copious discharge of bloody fluid and temporary relief: a fungous substance then issued from the opening, and continued to yield an ichorous discharge. He was received into the hospital of Pavia in March 1820, that is, about a year and a half after the beginning of the complaint. At this time, there projected between the lids a tumour equal in size to a large nut, deep red, with one or two black points in the middle, which was fissured, and poured out a sanious ichor. It was soft to the touch, and frequently bled; it appeared to belong to the conjunctiva rather than to the globe of the eye. The other eye was perfectly blind although apparently healthy; the boy was deaf and deprived of taste, taking indifferently sweet or the bitterest fluids; he had also lost the power of articulation; for he merely uttered cries in the first three days after he came to the hospital, then fell into a state of coma, which lasted till his death on the 29th of March.

There were no external glandular tumours. The contents of the thorax and abdomen were healthy, excepting the mesenteric glands, which were enlarged to four or six times their natural size, and might have been truly called strumous, both from their consistence and the atheromatous substance which they contained.

The bones of the cranium were very thin, particularly at the coronal suture. The membranes, and the brain viewed externally, presented the normal appearance, excepting an extraordinary volume transversely in the situation of the sella Turcica. The ventricles contained between four and five ounces of bloody serum. A large adventitious growth was developed in the middle and anterior part of the brain, under the ventricles. Its superior surface projected into those cavities, forming a considerable tumour on each side between the corpus striatum and thalamus nervi optici, pushing the fornix and septum lucidum upwards, and separating the optic thalami from each other, so that they were half an inch apart at the point where they are naturally in contact. The morbid growth occupied below a large part of the anterior cerebral lobes, the union of the optic nerves, the inferior surface of the corpus callosum and third ventricle, a part of the right middle lobe, and the interval between the crura cerebri. Its colour differed in different parts; it was generally whitish, particularly between the optic thalami, where it presented small roundish elevations; in some parts yellowish, and in others red. Its consistence was less firm than that of the brain, particularly at the basis of the right corpus striatum, where it gave way when touched with the finger, giving issue to some thin fluid with portions of soft cerebral matter. On a section it was found to be composed of an inorganic? matter, marbled with red and white. It seemed to be a fungous degeneration of the medullary and cineritious substance of the basis of the corpora striata, of the inferior surface of the third ventricle and of the parts near the optic thalami. The right optic nerve, enveloped in the diseased portion of the middle cerebral lobe, was enlarged, red and very soft: the left was quite natural. The united portion was expanded to twice its ordinary breadth, changed into a soft reddish substance, and firmly adherent to the dura mater. The right optic nerve presented within the orbit an enlargement of oval form equal in size to a small walnut. It consisted of a reddish substance, without any trace of nervous fibres, soft and pultaceous in the centre, firmer at the circumference, and covered by the usual fibrous sheath. The left nerve had a similar enlargement. On dividing it, the nerve was found in the centre, of natural size and colour, while the tumour consisted of a soft caseous matter deposited between the fibrous sheath and the surface of the nervous filaments. The left eye was sound; the right enlarged, changed in structure, ulcerated, and pushed forwards by morbid deposition in the cellular substance of the orbit. On a section of the eye, its cavity was found filled with a very soft, whitish, and reddish substance, which probably consisted of the retina changed in structure; for no trace of that membrane could be discovered, although the sclerotica and choroid could be clearly made out; and the morbid growth was continuous with the anterior extremity of the optic nerve. The nerves of the third pair, pressed upon by the tumour, presented, each of them, a small oval enlargement near their origin.*

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* *Annotazioni Anatomico-Chirurgiche sul fungo midollare dell' occhio, e sulla*

SECTION V.—MELANOSIS OF THE EYE.

In this disease, a soft adventitious production is developed within the globe, which it distends and enlarges; it then makes its way outwards by gradual absorption of the tunics, and presents a dark livid or black fungous mass, which ulcerates, sloughs, and bleeds. The affection is particularly characterized by the dark livid colour of the new formation in its earliest period, and by its deep sooty blackness in the fungous stage; hence its name of *melanosis* (from μελας, gen. μελανος, black.)

The occurrence of the affection is often ascribed to injury; but it may appear independently of any external cause; and we are quite unable to assign the circumstances, which impress on the disease its peculiar character.

It begins with inflammation of the eye and pain in the head; amaurosis comes on. The globe begins to swell, and the sclerotica, as far as can be judged through the plexus of distended vessels covering it, assumes a dark livid cast. The lens loses its transparency, and together with the iris is pushed forwards against the cornea, the latter becoming dull. The enlargement of the globe increases, and deep livid tubercles show themselves on its circumference at various points.* The morbid mass, in which all appearance of the normal structures is now lost, is deep livid, or black throughout, distending the lids, or passing between them. The ulcerative or sloughing processes now begin, and a thin dark-coloured ichor, or thick black fluid, as if produced by dissolution of the texture, is discharged abundantly. Masses of the growth are separated at intervals by sloughing; great pain in the eye and head, and constitutional irritation accompany the process; symptoms of cerebral affection frequently occur, and the patient dies comatous or insensible.

The absorbent glands have not been affected in the cases which I have seen.

When an eye, which has been thus disorganized, is examined, we find the globe, with the other contents of the

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depressione della cateratta di B. PANIZZA; Pavia, 1821, p. 8---19. The various changes in the brain and the optic nerves are represented in three plates.

* The appearances of the disease, in its earlier stages, are represented by Mr. TRAVERS, in the first, third, fourth, fifth, and sixth figures of his fourth plate.

orbit, converted into a morbid mass, which in texture and consistence is analogous to the medullary growths. Some part may even have the greyish colour of fungus hæmatodes. But it is principally, if not wholly, of the deepest sooty black; at all events, the anterior fungous portion is of this colour, though the posterior or deeper-seated part is lighter. The tumour imparts a black stain to the finger, or to white paper; it breaks down readily under pressure, and communicates to water a dark turbid discolouration, like that of Indian ink, after which the substance presents a loose fibrous texture of brownish hue.

The optic nerve is sometimes discoloured in an early period of the affection, before the figure of the globe is changed. Its substance, as exposed in a vertical section, is seen of a blackish grey, like that of the morbid growth within the globe, in the first figure of Mr. TRAVERS's fourth plate.

When the orbital contents have undergone the change of structure just described, the disease spreads through the foramen opticum into the skull, and leads either to the formation of a melanoid tumour under the anterior lobes of the brain, or to the production of similar growths in the interior of the organ. At the same time the disease shows itself in various other parts of the body, such as the contents of the thorax and abdomen, the bones and skin. These secondary affections may appear as tubercular masses, more or less firm in consistence, as depositions of black substance in a nearly fluid state, or as infiltrations of the texture of an organ with the same matter.

I have not seen melanosis before the age of thirty; it usually occurs at or after the middle period of life. Its progress is more rapid than that of scirrhus; it may go through its whole course in twelve or eighteen months.

As melanosis agrees with fungus hæmatodes and cancer in pursuing its destructive progress in spite of all means hitherto discovered, whether internal or external, the only questions respecting treatment are, whether the diseased parts may be removed with a reasonable chance of permanent cure; whether life can be prolonged by the operation; at what period it may be performed with the greatest advantage; and under what circumstances it would be hopeless. There is every reason to believe that the extirpation of the disease has been permanently successful in many instances; hence the prognosis of operations is by no means so unfavourable in melanosis of the eye, as in fungus hæmatodes or cancer. The earlier it is performed, the better is the patient's chance: the most favourable time is before the coats of the eye have given way, when the disease, being confined to the organ, admits of entire removal. When a sloughing and ulcerating fungus has projected externally, there is great fear that the optic nerve may have become diseased, that morbid changes may have taken place within the skull, or in some internal organ, or that disease may recur in the orbit. As we cannot be secure against these various sources of risk, we should only undertake the operation under a doubtful prognosis. In some instances, patients have died soon after the operation, apparently from the existence of secondary disease in the liver; in other cases death has ensued after a longer period from melanosis of the brain.

CASE I. WARREN, a native of Ireland, rather more than thirty years of age, came under my care at St. Bartholomew's Hospital in May, 1825. Although he stated that the eye had been diseased for nearly two years, the morbid structure had not yet shown itself externally. The globe was somewhat enlarged; this circumstance being distinctly observable when the two eyes were compared, with the eyelids closed. An opaque lens of muddy brownish hue was pushed into the pupil, and closely squeezed, together with the iris, against the cornea, which was dull. A dark discolouration was obscurely perceptible on the surface of the globe, at some distance behind the cornea: it was completely covered by a dense arrangement of large vessels, apparently filled with venous blood. Although the form of the globe was not altered, and its size but little increased, and although the morbid structure could not be actually seen, I could only refer the appearances just enumerated to the development of melanoid disease within the globe. The dark discolouration behind the cornea, and the plexus of large turgid livid vessels covering it, were appearances that I had not before seen, and indicated, as I thought, organic disease in the eye; while the state and situation of the lens and iris showed the existence of some distending and protruding cause in the back of the globe. The patient readily assented to my proposal of removing the eye, which was performed in the usual manner. The progress of the case after the operation was favourable, and the patient was soon able to leave the hospital. I saw him in June, 1826, when the contents of the orbit were sound, and the general health excellent.

A vertical section was made of the eye, which is preserved in the museum of St. Bartholomew's Hospital. The sclerotica presents its normal appearance, except that it is a little prominent at two or three points, and that it has undergone absorption in one situation, not far from the optic nerve, so as to allow a small knotty protrusion of the internal growth, as large as a horse-bean. The cornea is natural; the lens and iris are in contact with it. The cavity of the globe behind the latter is filled with a tolerably firm adventitious growth, the section of which exhibits a somewhat lobulated arrangement: it is generally black, but one or two points are of a dusky grey. This melanoid deposit, which distends the sclerotica, holds the place of the textures naturally contained within that tunic. An imperfect remnant of the choroid is discerned on its surface; but there is no trace of retina or vitreus humor. The optic nerve was sound at the part where it had been cut through.

Extirpation of the eye, on account of melanosis in a rather more advanced stage, was performed by Mr. TYRRELL at the London Ophthalmic Infirmary, in the year 1825. The patient recovered favourably from the operation, and was in good health in the country at the distance of a year from her convalescence.

CASE II. *Melanosis of the eye; operation; death from disease of the liver.*—In 1825, I removed, in St. Bartholomew's Hospital, the eye of a patient sixty-five years of age, in whom the organ had become enlarged, and was completely disorganized by melanosis, so as to present a deep, livid, and black mass, with projecting inequalities and partial ulceration. The patient's countenance was sallow and unhealthy, like that of a free liver. The disease had existed about twelve months at the time of the operation, which was performed at his own request. He went on well for ten days, when his strength began to fail, without any obvious cause, and he gradually sunk.

The sclerotica and the optic nerve were the only parts of which any trace could be observed in the extirpated mass. The latter consisted of a dull greyish texture approaching to the medullary character, with a slightly marked lobular arrangement, surrounding and compressing the remains of the sclerotica. This greyish and tolerably firm substance was gradually changed towards the front into a softer deep black melanoid texture, which composed the anterior tubera and fungus. At some points a slight infiltration of the black matter extends throughout the morbid mass. The cavity of the sclerotica is filled with melanoid deposit. The optic nerve on the operated side was diminished in size as far as the commissure, behind which both nerves were natural. There was no disease in the brain or membranes. The liver was enlarged to at least twice its ordinary size, and diseased throughout, being filled with adventitious deposits, varying in size from that of a pea to a large orange. In texture and consistence they resembled the depositions of fungus hæmatodes. Some were white or reddish, some of the deepest black, and others presented all the various intermediate shades.

No disease was discovered in any other part. The eye, a portion of the basis cerebri, and specimens of the liver are preserved in the museum of St. Bartholomew's Hospital.

CASE III. *Melanosis of the eye ending fatally; melanoid tumor within the skull; disease of the liver.*—A corpulent woman, forty-five years of age, came under my care at the London Ophthalmic Infirmary, for melanosis of the eye, by which the organ had become enlarged and disfigured by projecting black tubera. The globe was moveable in the socket, and I proposed extirpation, to which she would not consent. At the end of some weeks, when she was willing to undergo the operation, I deemed it unadvisable from the great increase of bulk in the disease. The globe was now more than half the size of my fist, distending the palpebræ enormously, and projecting between them. It had ulcerated, and a thick black fluid flowed from the part. The general health was not much disturbed until a few weeks before death, when symptoms of cerebral disease came on, and the patient died comatous about eighteen months from the commencement of the complaint.

The globe and other orbital contents were converted into an uniform soft mass of sooty blackness, from which a thick black fluid could be scraped or squeezed out, similar to that which had flowed from the fungus during life. The skin or linen applied to the cut surface of the morbid growth, became soiled with an inky mark. The disease was continued by the optic nerve into the skull. The nerve itself was converted into a soft black substance, and expanded, after passing the foramen opticum, into a soft black tumour, as large as a small orange, situated under the anterior lobe of the brain, and partially penetrating into its substance. In the liver we found two depositions of similar character, one about the size of a walnut, the other that of a pea.

CASE IV. *Melanosis of the left eye; extirpation of the* *globe; relapse of disease; secondary affections of the liver and other parts.*—A female, forty-one years of age, of delicate constitution and sallow complexion, found the sight of her left eye imperfect two years and a half before she came under the care of Mr. A. BURNS; a milkiness was at this time observed behind the pupil. The opacity of the lens increased, and in four months the vision of that eye was lost. Two months after, the eye became inflamed, without any obvious reason. By the use of leeches and other means, the inflammation was lessened, but the redness and pain did not cease entirely. Six months before the operation a tumour began to form on the lower part of the sclerotica, just behind the cornea. It was as large as a musket-ball, and numerous red vessels were seen on its surface. There was hysteria with pain in the back, and severe lancinating pain in the eye, which interrupted sleep. In four months after, there was confirmed hectic, with emaciation, debility, and broken state of health: the patient had been confined to bed two months. The cyst had increased to the size of a pigeon's egg, and formed a solid fungous mass, covering the under eye-lid. Towards the external angle there was a hard tumour, adhering firmly to the bone. The eye-ball was extirpated, but the tumour adhering to the cheek-bone could not be completely removed, the bone itself being carious.

When the eye-ball and optic nerve were divided, a thick viscid matter of dark brown colour covered the knife. The tumour seemed at first sight composed of a similar dark-coloured matter, which was of the consistence of thick oil paint; it soiled the fingers of a dark brown colour, and dissolved readily in water, leaving the solid parts more distinct. The cornea and sclerotica were sound, but the latter had given way opposite to the malar bone, so as to allow the substance within the globe to pass out and form an external tumour. The lens was opaque and amber-coloured. There was no trace of the iris, or of the retina. The choroid was thickened and more vascular than in the natural state. The contents of the eye-ball, and of the tumour exterior to it, consisted of pulpy substance, variously tinged in different places by the dark brown colouring matter. The medullary substance of the optic nerve was of black colour, like that of the matter in the globe.

The patient, who had been greatly emaciated, regained appetite, flesh, and strength, after the operation. The orbit gradually filled up with a soft substance of dark colour, which skinned over. Her health soon declined again; she experienced most severe pains in the loins, which confined her to bed; and an elastic fungus began to protrude the lower lid, and to project between the lids. This disease caused no uneasiness: but the pain in the back and loins was so excruciating, as to make her scream from agony. After lingering two or three months, with the tumour below the orbit increasing, and the pain of the loins not relieved, she died extremely emaciated, having become suddenly comatous twenty-four hours before death.

The tumour in the orbit proceeded from the antrum, the parietes of which had given way above and in front. The morbid growth also projected into the nostril. It presented externally small knobs of dark livid colour. It was composed internally of a soft matter, of inky colour, intermixed with a greyish substance and ragged fragments of bone. The floor of the orbit was elevated so as to be nearly in contact with the orbital plate of the frontal bone; the fungus was therefore exterior to the orbit. The substance of the optic nerve, from the point where it had been divided, was of black colour. Within the cranium, the nerve was as large as the little finger, and black. The junction of the nerves was enlarged into a tumour, which projected into the third ventricle. The dark colour was continued beyond the union, along the nerve of the same side. On the opposite side the nerve was natural in size and colour, and the two were only connected by cellular shreds.

The liver contained tumours similar in structure to the contents of the eye-ball, and a cyst filled with grumous purulent matter. Above the kidnies there were considerable tumours of similar nature. The uterus was of cartilaginous density.*

Case v. *Melanosis of the eye; extirpation of the organ; death from secondary affection of various parts.*—In the spring of 1822, John Henston, a shoemaker, aged fifty, laboured under a severe affection of the right eye, attended with pain in the orbit and head, for which extirpation was deemed necessary. There was no return of disease or pain in the part after the operation. On the 18th of March, 1823, he was received into the Royal Infirmary of Edinburgh, with symptoms of pleurisy, for which he was bled, blistered, and purged with considerable benefit. The symptoms had disappeared on the 23rd, excepting a cough, which yielded in a few days to gentle means. On the 1st of April he complained of weakness merely, for which generous diet with wine was ordered; but he died in the course of the night, without any suspicion of serious organic disease having been entertained.

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* Mr. Wardrop, in *Lib. Cit.* p. 74—80, and plate iii. fig. 1.

In the extirpated eye, "the situation of the vitreus humor was completely occupied by a black-looking fibrous mass, pushing the choroid coat and retina into the posterior chamber. These tunics had undergone no sort of alteration, and the sclerotica was entire. The cornea had sloughed; but this was to be attributed to the general distension of the globe, and by no means to any alteration in the texture of the tunic, since it was nowhere in contact with the morbid matter lodged behind the iris. There was a considerable mass of black matter lodged posteriorly to the globe, and deep in the orbit, apparently in the fat and cellular tissue surrounding the optic nerve. When we examined the orbit after death, we observed that the disease had been reproduced in its old situation, and at the expense of the cellular tissue; for the muscles and nerves, so far as we could trace them, had undergone no alteration." There were "a number of black globular bodies lying in the cellular tissue, between the pectoral muscle and third and fourth ribs of the left side, about the size of peas, and some of them adhering to the periosteum. The substance of the rib itself was completely black, as was also the sternal third of the clavicle of the same side; but these bones were in no other way altered from their natural state. Upon opening the chest, the pleura was found studded with similar tumours, here and there insulated, but in general aggregated, so as to resemble a cluster of purple grapes. The last-mentioned phenomenon was particularly remarkable on the right lung, along the bodies of the vertebræ on both sides, and upon the surface of the diaphragm on the left. Many of the tumours were hardly raised above the pleura, but others had long slender necks, so that they were like polypi. In colour most of them were jet black, others of a deep purple, or even of a reddish hue, while a third sort seemed to contain portions of a peculiar white colour, blended with black. The lungs were extensively beset with these tumours; and several of an exceedingly small size were detected under the mucous membrane of the bronchiæ. The pericardium, and the very substance of the heart were studded with melanose bodies. As the cause of the symptoms under which the patient laboured during life, upwards of three pounds of fluid were found in the cavities of the pleura, and there was a thin pellicle of albuminous matter covering the surface of the lungs. In the abdomen, the liver, spleen, kidnies, omentum, and peritoneum in different places, were affected in the same manner; but the tumours in the liver contained a considerable portion of white cerebriform matter. Similar tumours were found connected with the internal table of the skull, where they had formed for themselves little excavations; in the subcutaneous cellular substance of the thorax and abdomen, so as to be discernible through the integuments; and, lastly, among the fibres of the intercostal muscles." "The tumours consisted of a cyst, separated by a loose cellular tissue from the surrounding textures, and containing the peculiar black matter of the disease in different states of consistence. In some pretty large tumours the matter was nearly solid; and in others, those exceedingly small, nearly fluid. No external differences were to be observed in these two species; there was no regular gradation in size, no difference in vascularity, that could have led us to suppose they were different states of the same disease, or in different states of development. In the liver only a remarkable variety was noticed. The tumours here were as large as chesnuts, some of them white, consisting of cerebriform matter, others were pure melanose; and others again contained melanose and cerebriform matter together; but all of them had cysts tolerably distinct from the surrounding hepatic texture."*

Case vi. *Melanosis of the eye; extirpation of the globe; death from secondary affection of various textures and organs.*—The history and dissection of a case, in many respects analogous to the foregoing, form the subject of a very interesting narrative by Mr. Fawdington, illustrated by several lithographic figures, which convey with great fidelity the characteristic appearances of the disease.

The patient, Thomas Peckett, thirty years of age, a robust, healthy looking man, was at first under the care of Mr. Wilson, surgeon to the Manchester Eye Institution, whom he consulted in January 1824, for a violent and incessant pain in the left eye. Six months previously he had received a blow on the organ, which caused little pain and no alteration in the external appearance of the part. A fortnight after the accident a sensation of fullness with imperfection of vision was experienced, and gradually increased, the former to a most distressing degree. The vessels of the conjunctiva and sclerotica were distended, and the latter tunic seemed to be undergoing absorption, as the dark choroid was just visible towards the internal canthus. The iris was dilated and immovable, and a slate-coloured opacity occupied the centre of the pupil. The symptoms were relieved by antiphlogistic means; but the pain returned, and became violent and incessant. At the end of March, the sclerotica had become very thin at the upper and inner part of the globe, and the bulging part was covered by the choroid. The opaque appearance in the pupil had now a dirty red colour. Mr WILSON removed the contents of the orbit on the 19th of April.

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* Cullen and Carswell on Melanosis, in the *Transactions of the Medico-Chirgical Society of Edinburgh*, vol. i. p. 271—275.

A section of the eye-ball discovered a black pultaceous tumour, occupying more than one-half of the interior of the globe, in the situation of the vitreus humor, of which no trace could be discovered. There were two cavities filled with a brownish red fluid, one at the side of the tumour, the other between the front of it and the lens. The choroid was entire, except at one part, where it was blended with the tumour. The sclerotica was reduced to an extreme degree of tenuity. The retina was separated from the choroid by the interposition of the disease, and gathered into a folded mass, placed in the axis of the globe, and connected anteriorly to the back of the crystalline capsule. The lens was opaque and amber-coloured. The optic nerve was sound at the part where it had been divided. He recovered from the operation. In August small black tumours, about the size of a shot, appeared in the skin of the face and back, and he became affected with pain in the side, cough, and difficulty of breathing. The abdomen soon began to enlarge; melanose tubercles showed themselves on the face, scalp, and lower lid of the extirpated eye, where it threatened ulceration; blue elevations, apparently from subcutaneous melanosis, appeared all over the chest and abdomen; the abdomen became exceedingly protuberant from enlargement of the liver, and death took place in November.

The subcutaneous stratum of adipous substance was beautifully granulated with melanose matter, in small encysted masses, up to the size of a pea. The liver was four times its natural size, and filled with melanose masses of various bulk, as well as with black infiltration. On making a section through the diseased organ, several ounces of dark fluid escaped, resembling deep chocolate paint in colour and consistence. This softer matter occupied the centre of the diseased masses. The peritoneum lining the parietes was covered with minute black dots; and melanose tubercles were found abundantly in the cellular tissue on the spine, in that of the various duplicatures formed by this membrane and in the omentum, around the kidnies, and on the concave surface of the diaphragm. The pancreas, spleen, and kidnies were thickly studded with black spots, some of which, especially in the pancreas, were as large as a Spanish nut; and similar depositions had taken place under the serous membrane of the stomach and intestines. The back of the sternum was superficially spotted. The cellular substance of the mediastinum and that connecting the pleura costalis to the parts which it covers contained melanose tubercles. Groupes of small black cysts with slender pedicles were scattered over the pleura costalis. Melanose matter was deposited interstitially and in spots under the pleura pulmonalis, and in tubercular masses through the lungs. Almost the whole surface of the heart was covered with black spots. The brain was not examined. No disease was observed in the nerves or blood-vessels.*

CASE VII. *Melanosis of the right eye; extirpation of the diseased organ; death at the end of three years from secondary melanoid disease of the brain.*—The right eye of a farmer, fifty-five years of age, having been diseased for ten years, and converted into a growth completely filling the bony cavity, was removed by Mr. WARDROP. No remains of any of the natural structures of the globe were recognisable, except the sclerotica, which had burst asunder, and was distended by the different portions of the tumour. This consisted of a dark brown or blackish substance, rather firmer than brain, but in some parts so soft as readily to be washed away with water. The patient recovered quickly after the operation, and remained in good health about two years. He then had a fit, which left no effect but that of weakness, and on the following day he went about his farm as usual. Six months afterwards he had a second fit, which was followed by great weakness, and some difficulty of speech. In a few months he had a third fit, followed by paralysis of the right arm and loss of speech. The fits now became more frequent; the right leg was paralysed, and the limbs of the left side, excepting the right hand, which was never affected, and which he employed in making signs till the time of his death, at the end of fifteen months from the first attack. The vessels of the meninges were distended. The substance of both hemispheres at their posterior part was unusually soft, and readily yielded to slight pressure with the finger. In the left hemisphere, on a level with the corpus callosum, a large mass presented itself of dark bloody colour, having at first the appearance of coagulated blood, but found, on minute examination, to be of firm consistence, with numerous small vessels passing through its substance. This mass seemed to have no connexion with the surrounding brain, which was quite natural, and formed a sort of bed for it. By immersion in water a quantity of blood was extracted, and the mass which remained was of a dark brown colour, consisting of very loose cellular tissue. In the substance of the right hemisphere there were several dark-coloured masses of the size of a pigeon's egg, very similar in texture to that found on the left side. The optic nerve on the right side, from its bifurcation to the orbit, was much wasted, having no medullary matter, and seemed to consist only of neurilema. At the extremity of the nerve, where it had been divided during the extirpation of the eye, there was a hard black granular tumour of the size of a small nut.* It seems that the cavities of the thorax and abdomen were not examined.

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* *A case of Melanosis* by TH. FAWDINGTON, London, 1826. There are eight lithographic plates representing the primary disease in the eye, and the secondary affections of the skin, liver, kidnies, intestines, pancreas, heart, and lungs.

Case viii. *Extirpation of the eye for melanosis; relapse at the end of two years.*—Mr. Wilson, of Manchester, has shortly mentioned a case analogous to the preceding, in which relapse of the disease took place at the end of two years. He says: "Two years ago I removed the eye-ball of a middle-aged man affected with melanosis; and I entertained sanguine hopes that no other organ would become affected, as such an interval had elapsed; but last week he called upon me, complaining of great general debility, loss of flesh, and mentioned that he had experienced frequent discharges per anum of a dark-coloured fluid. Upon examining the orbit, from which the globe had been removed, I perceived upon the granulations a portion of black matter, the size of a currant, of a pyriform shape. He said he had at times lost some blood from the orbit, but very trifling in quantity. Upon dividing the peduncle, two or three drops of dark blood, if blood it could be called, issued from the wound. The case is still under my observation, and I hope, at some future time, to be enabled to communicate it to the profession."[*]

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* *Lancet*, vol. xi. p. 89.

SECTION VI.—EXTIRPATION OF THE EYE.

CAREFUL preparation of the patient, by regulation of diet and attention to the state of the bowels, for some days previously, is advisable, in order to prevent the occurrence of inflammation, which is easily communicated from the orbit to the important connected and contiguous parts.

The operation itself, although its bare mention is distressing and shocking to the feelings of patients and their friends, is neither difficult, tedious, nor dangerous, when executed properly and under the requisite precautions, of previous measures and subsequent management. The lids must be divided at their external commissure, and turned back so as to expose completely the anterior opening of the socket; the conjunctiva must then be cut through at its reflexion from the palpebræ, and the diseased mass must be detached from the socket, to which it is connected by cellular tissue, more or less loose; the third and last portion of the operation consists in severing the orbital contents thus insulated, at their posterior attachment, by cutting through the muscles of the globe and the optic nerve. The instruments required are scalpels and forceps; some of the former should be double-edged and pointed; a strong curved needle, armed with a stout thread; a double-edged knife, curved on the flat; and a pair of strong scissars similarly curved.

The patient should be placed in the recumbent position, with the head a little raised on a pillow. The separation of the eye-lids, at their temporal junction, would be expedient, in order to give room, even if the globe were of its natural size, but it is absolutely necessary in that more or less considerable enlargement, which exists almost invariably when the operation of excision becomes necessary. This point is accomplished by a straight incision, which should be an inch or an inch-and-a-half long, or at least sufficiently extensive to admit of the palpebræ being completely turned back so as to expose the margin of the orbit. After dividing the commissure of the lids, they must be dissected from the base of the tumour above and below, by a few strokes of the knife, by which the conjunctiva is divided more or less completely, at its reflexion over the globe. The curved needle is now carried through the diseased mass, and the ligature thus introduced, held either by the operator or an assistant, allows of the disease being moved in any convenient direction as the dissection proceeds. The eye being drawn gently upwards, a semicircular incision is carried from one angle to the other, along the inferior margin of the orbit, and we proceed, by cutting in the same direction, to detach the contents of the orbit from the bony cavity, as far as we can conveniently carry the knife. In this dissection, we cut through such part of the conjunctiva as had not been divided in turning back the eye-lid and the inferior oblique muscle. The two extremities of this first incision are now united by a second semicircular cut carried along the upper edge of the orbit, and the mass is detached above; here we first cut through the conjunctiva, and then the tendon and pulley of the trochlearis muscle. The object is to remove the entire orbital contents, which is most effectually and conveniently accomplished by dissecting close to the bone, and employing a double-edged scalpel. As the roof of the orbit is naturally as thin as paper at some points, and as it sometimes undergoes absorption in consequence of pressure, especially when long continued, the cavity of the cranium might easily be penetrated by the sharp point of the knife, if it were used incautiously. To avoid this risk, the eye should be drawn downwards, and the dissection conducted very carefully at the superior part of the orbit. When the diseased mass has been detached all round, it merely remains to cut through the muscles and optic nerve behind; and this division may be accomplished with the straight scalpel, the curved scalpel, or the curved scissars. As the external side of the orbit slants from without inwards, while the internal goes directly backwards, this last step of the operation can be accomplished most conveniently by introducing the instrument at the outer side of the cavity.

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[*] Mr. FAWDINGTON, *Case of Melanosis*, p. 3.

The surface of the orbit should be gently and carefully examined with the finger; if the lacrymal gland, or any portion of the disease has been left behind, it should be removed.

The vessels divided in the operation bleed freely; when the wound is sponged, it fills again directly with blood, so that we cannot direct our dissection by the immediate sight of the parts, which we are dividing. Profuse hemorrhage generally takes place from the ophthalmic artery; it usually ceases spontaneously; but if it should proceed to an alarming extent, it must be stopped by pressure. A piece of lint rolled firmly into the shape of a conical plug may be held on the vessel until the blood ceases to flow, when it may be gently removed. If the bleeding should require it, a compress of folded linen might be placed over the plug, and secured by a circular bandage for a short time.

The practice, which some have recommended and followed, of filling the orbit with lint, sponge, or other matters, seems to me decidedly objectionable. From this introduction of extraneous substances into a recent wound, we can expect no other result than irritation and inflammation. We should use every precaution to avert such results, which would become very dangerous in this case from the direct connexion between the sheath of the optic nerve, the periorbita, and the dura mater, and the immediate contiguity of the brain and its membranes with a large portion of the wound. It will be sufficient to unite the divided commissure of the lids by one or two sutures, to cover the part with a soft rag dipped in cold water, renewing it as often as it becomes dry or warm. The patient should be kept quiet in bed, and restricted to a spare diet, until all risk of inflammation is past. The bony cavity granulates, and becomes filled, to a certain extent, with a newly-formed vascular mass; the eye-lids sink inwards, and become concave. There is no support for an artificial eye, nor indeed sufficient cavity for its reception; a green or black patch must therefore be worn over the orbit to conceal the deformity consequent on the operation.

CHAPTER XXVII.

Miscellaneous subjects. Ophthalmia consequent on phlebitis. Hydrophthalmia. Atrophy of the Eye. Collapse after suppuration or evacuation of the humors. Exophthalmia. Ossifications. Calcareous deposits. Entozoa in the Eye.

SECTION I.—INFLAMMATION AND DESTRUCTIVE SUPPURATION OF THE EYE, OCCURRING AS A SECONDARY EFFECT OF PHLEBITIS.

MR. ARNOTT has pointed out the connexion between this affection of the eye and phlebitis, in his comprehensive and valuable *Pathological inquiry into the secondary effects of inflammation of the veins,* published in the fifteenth volume of the *Medico-chirurgical Transactions.* No additional light has been thrown on the subject since that paper was published.

In a patient, who had undergone the operation of cutting out a portion of varicous vein in the right leg, inflammation of the posterior saphena ensued, and the case terminated fatally on the ninth day. It had been observed, the day before, that the eyes were kept constantly closed; the conjunctiva was found red, and the cornea opaque on both sides. The following circumstances were noticed on examination of the body: the vein partly plugged with lymph, partly filled with pus; fluid pus in several muscular branches. Deep-seated abscesses under the fascia of the left fore-arm and leg, and sero-purulent effusion between the muscles of the right fore-arm. A recently formed abscess in the upper lobe of the right lung. Serous infiltration of the pia mater, particularly towards the basis of the brain. Effusion of lymph round the trunks of the carotid arteries. The nerve of the third pair on the left side flattened, and softer than that of the right; a similar change, to a greater extent, in the fifth nerve of the right side. "It has been remarked, that during life great opacity of both corneæ had taken place; the surface of which had become rough. On removing the right eye, destructive changes were found to have taken place within the globe; the crystalline was so soft as to yield to the slightest touch; the vitreus humor was of a reddish yellow colour, and red vessels could be distinctly seen traversing its membrane. The retina was of a deep red colour."[*]

The following case is related by Mr. ARNOTT:—"A young man had a ligature placed on the left carotid artery, for an aneurismal disease of one of its temporal branches. Considerable difficulty was experienced in passing the needle round the vessel. Venous hemorrhage took place during the operation, recurred at night, and occasionally afterwards for nine days. On the fifth day after the operation, the patient had a severe rigor, succeeded by heat of skin and general febrile symptoms. These increased, the pulse rose to one hundred and twenty, and the constitutional disturbance assumed a very violent character. About the tenth day, the vision of the left eye became impaired, and was quickly lost; the pupil was contracted, the iris immovable, and the cornea had a somewhat hazy appearance; effusion took place under the conjunctiva, and the eye-lids were greatly swollen, giving the appearance of the globe being much protruded; at the same time, there was a degree of deafness, considerable stupor, with occasional slight delirium. In the course of a few days, the coats of the eye sloughed at the upper part, and its contents were evacuated. Whilst these changes were occurring in the eye, collections of matter formed, without pain, in different parts of the body, in both shoulders above the insertion of the deltoid muscles, over the sacrum, &c. The constitutional disturbance abated, the collapsed eye healed over, but he never recovered his health. Five months subsequently he died, labouring under lumbar abscess, and worn out by hectic. On examination of the body, a portion of the jugular vein, to the extent of two inches, was found wanting; the upper and under extremities being shrunk, ligamentous, and gradually lost in the cellular substance. On opening the head, pus was found effused in great quantity between the tunica arachnoidea and pia mater, along the base of the brain, and the whole length of the spinal cord. The intermuscular cellular substance of the loins was loaded with pus. The viscera of the abdomen and chest were not examined."[†]

When this narrative is compared with the circumstances of the case previously quoted, we shall have no difficulty in concurring with the conclusion suggested by Mr. ARNOTT, that the affection of the eye, in this instance, arose from inflammation of the jugular vein.

[*] *London Medical Gazette*, vol. ii. p. 284—286.

[†] *Med. Chir. Trans.*, vol. xv. p. 118—120.

An inflammatory affection of the eye, characterised by redness of the conjunctiva and chemosis, with opacity of the cornea, and subsequently by ulceration or suppuration of that part, and collapse of the tunics, has been described by Dr. MARSHALL HALL and Mr. HIGGINBOTTOM, in a paper entitled, *Cases of destructive inflammation of the Eye, and of suppurative inflammation of the integuments, occurring in the puerperal state, and apparently from constitutional causes.*[*] The paper contains six cases, in which the disease of the eye occurred at various periods, from the fifth to the eleventh day after delivery. They were attended with redness of the integuments in the upper and lower extremities, and formation of matter under the skin. They all terminated fatally, not from the affection of the eye, but from the other preceding and concomitant disorders, which were serious. The pathology of these cases remains obscure, inasmuch as the nature and causes of the affection were not elucidated, in any instance, by examination after death. All the circumstances, however, strongly support the opinion expressed by Mr. ARNOTT, that the disease of the eye was a secondary inflammation consequent on uterine phlebitis.

SECTION II.—HYDROPHTHALMIA.

The globe of the eye may be enlarged, partially or generally, by increase in the quantity of the humors, or by effusion of an aqueous fluid. The affection is called *dropsy of the eye; hydrops oculi; hydrophthalmia, hydrophthalmus.* Systematic writers have divided it into three kinds:—1st, *Dropsy of the cavities containing the aqueus humor; hydrops cameræ anterioris*, 2nd, *Dropsy of the vitreus humor; hydrops corporis vitrei;* 3rd, *General dropsy of the eye-ball; hydrophthalmia*, properly so called; *hydrops oculi mixtus; buphthalmus* (ox-eye, from βους, ox, and οφθαλμος, eye, to denote the enlargement of the organ.)

The name of dropsy, which has been applied to this state of the eye, from the mere circumstance of the globe containing a collection of watery fluid, has misled some writers into the supposition, that the causes and nature of the disease are like those of other dropsies, that it owes its origin to a morbid state of constitution, and requires the use of anti-hydropic remedies. "Dropsy," says **Beer**, "arises in the eye, as it does in any other part of the body, from a disproportion between the processes of secretion and absorption. Hydrophthalmia seldom exists as a local disease; it is at least always connected with a more or less obvious cachectic state of body; or it is symptomatic of a previously existing dropsy, for example, of anasarca, of external or internal hydrocephalus, of dropsy in the cerebral ventricles. Sometimes it appears in chlorotic girls as a symptom of that cachexia."* In his further remarks on the particular species of the complaint, he enumerates, among their causes, the sudden healing of cutaneous eruptions, particularly tinea capitis and itch, and the unhealthy states of constitution produced by scrofula, syphilis, and scurvy. In the same way **Juengken** regards it as resulting from morbid states of constitution, such as the scrofulous, rheumatic, and gouty, from severe colds, from serious abdominal disturbances, particularly those connected with menstruation in women; from disorders of the abdominal viscera, hemorrhoids, the healing of ulcers of the legs, and the suppression of perspiration in the feet, in men. He also considers that it may happen from metastasis.† The facts which have come under my observation, have not afforded the slightest support to these pathological views, nor to the measures of treatment founded on them.

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[*] *Medico-chirurgical Transactions*, vol. iii.

Dropsy of the cavity containing the aqueus humor.—I have seen dropsical enlargement of the chambers, with the cornea transparent or slightly nebulous, as a congenital defect, in children otherwise healthy. The subjects of this malformation have either seen very imperfectly, or been blind. **Juengken** says that he knows a Swedish family, in which seven brothers are affected with congenital dropsy of the anterior chamber, while the parents and two sisters have no defect in their eyes.‡

Mr. **Ware** observes, that children are sometimes born with eyes remarkably large and prominent, and with an opaque state of the cornea. This happened in three children of the same family. The opacity in these cases gradually diminished after birth, without any applications: in two of them, it was quite removed in less than a year; while in the third, the alteration was not complete until the end of the second year. Mr. **Ware** found the cornea very prominent in these children, who were all short-sighted, though they had recovered distinct vision. In another new-born infant both corneæ were large, prominent, and completely opaque. At the end of nearly three years, the left cornea was sufficiently clear to allow the perception of all large objects; the opacity of the right cornea being also diminished round its outer edge, though the greatest part of the pupil was still obscured. In a fifth case, both corneæ, at the time of birth, were large, prominent, and completely opaque, the child in other respects being healthy. At the end of a year, the cornea of one eye is not only perfectly transparent for a considerable space round its circumference, but the pupil can be seen through the diminished opacity which remains in its centre; and though the cornea of the other eye has improved less, its transparency has increased, particularly towards the circumference.*

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* *Lehre*, vol. ii. p. 616.

† *Lehre von den Augenkrankheiten*, p. 540, 541.

‡ *Lib. cit.* p. 541.

I have seen the anterior chamber enlarged, so as to contain about three times the natural quantity of clear aqueous fluid, the cornea being perfectly transparent, and the pupil filled with an opaque adventitious membrane, as the consequence of acute internal inflammation, which had destroyed sight. The eye had been in the same state for some years.

Long continued strumous inflammation of the cornea is attended with increased secretion of the aqueous humor and enlargement of the anterior chamber; the latter change being produced partly by greater prominence of the cornea, partly by the iris yielding to the pressure of the accumulating fluid. When the inflammation is at an end, the eye presents a natural appearance in all other respects, but the dropsy of the anterior chamber remains. Near-sightedness is produced, but vision is otherwise perfect. In a case of this kind there may be nebulous opacity of the cornea, with more or less imperfection of sight. I have seen this state of the eye remaining long after the cessation of strumous inflammation: I am unable to state whether it is ever removed, in the course of years, so as to restore the natural proportions of the anterior chamber.

I have lately seen a case of inflammation of the eye, accompanied with enlargement of the anterior chamber. The patient is about twenty-five, of good constitution, and in good health, except as far as regards the eye. The latter, of which he states the vision to have been always imperfect, became inflamed while he was on duty, as a naval officer, in the Mediterranean. The disorder has continued with more or less violence between one and two years, and obliged him to return to England. At first view the globe appears enlarged, but I can discover no increase of size, except in the anterior chamber, which contains about three times the usual quantity of aqueus humor. There is external redness of the eye, chiefly in the sclerotica, round the margin of the cornea; the latter is a little nebulous at its circumference. The iris and pupil are nearly natural, and move well. The lens is opaque. Increased redness, with pain of the eye and head, comes on occasionally; but in general there is no uneasiness. The active congestion was removed by cupping, low diet, and aperients. I then evacuated the aqueus humor, and have repeated the process four or five times. The eye has become quite quiet; but the case still remains under treatment.

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* *Tracts on the Eye*, London, 1828, p. 285—288.

Staphyloma may be considered as dropsy of the posterior chamber; for the tumor formed by the expanded cornea and iris is filled with aqueus humor. (See page 373.) We may probably regard in the same light the bulging of the iris, accompanied with absorption of the sclerotica round the cornea, occasionally consequent on severe and long-continued strumous iritis.

When the disease which has produced increased secretion of aqueus humor is at an end, and the enlargement of the cavity containing it is not considerable, we can do no good by surgical interference. Should inflammation still exist, with painful distension of the globe, should the enlargement be troublesome by its magnitude, or should it be attended with occasional attacks of inflammation exerting an injurious sympathetic influence on the sound eye, palliative relief may be afforded by puncture of the cornea; under circumstances of greater inconvenience and urgency, a larger opening may be made in the part, with the view of accomplishing more effectual and permanent diminution.

Dropsy of the vitreus humor.—I know no external signs, by which it can be determined whether enlargement of the globe, at its posterior part, is caused by an effusion of watery fluid, or by increase of the vitreus humor. In an example of the latter kind, which came under my observation, I did not discover the nature of the case, until I had made a puncture behind the cornea, for the purpose of lessening the size of the globe.

In all the other instances of hydrophthalmia which I have seen, the globe has been distended with aqueous fluid; my experience, therefore, would coincide with that of SCARPA, as expressed in the following passage. "The generality of surgeons teach, that the immediate cause of the dropsy of the eye is sometimes the increase of the vitreus, at other times of the aqueus humor. In all the cases of dropsy of the eye, which I have operated upon, or have examined in the dead body, in different stages of the disease, I have constantly found the vitreus humor, accordingly as the disease was inveterate or recent, more or less disorganized, and in a state of dissolution; nor have I been able, in any instance, to distinguish, on account of the increased quantity, which of these two humors, vitreus or aqueus, had had the greater share in the formation of the disease."*

General hydrophthalmia.—Dropsical enlargement of the globe generally, to which the terms *hydrophthalmia* and *hydrops oculi* would be properly applicable, results from changes of structure caused by serious and long-continued inflammation, such as the strumous, variolous, and purulent. The cornea is partially or generally opaque; the external tunics are distended and rendered thinner; the front of the enlarged globe, which sometimes protrudes between the lids, is often irregularly protuberant. The interior is usually filled with aqueous fluid. This state of the globe is attended with the same inconveniences as staphyloma, and with equal or greater deformity. By its enlargement, irregular figure, and unusual protrusion, it causes irritation of the lids, or experiences mechanical irritation from them; and the inflammation thus excited irritates and weakens the sound eye. Under such circumstances, we may try the palliative relief of evacuating part of the fluid by puncture of the cornea or sclerotica. By repeating this proceeding, we may produce a sufficient diminution of the enlarged globe. If this plan does not succeed, we must perform the same operation as in staphyloma; the coats of the eye will then collapse, and the deformity will be remedied by the adaptation of an artificial eye.

SECTION III.—ATROPHY OF THE EYE.

A kind of change exactly opposite to that last considered is not unfrequently observed in the eye; the organ undergoes absorption, and is slowly reduced in size, without suppuration, or any obvious alteration of structure: all the textures are equally diminished, so that the globe is lessened in all its dimensions by this kind of shrinking, which is called *atrophy of the eye*, (*atrophia, aridura bulbi.*) It frequently occurs in consequence of internal inflammation following penetrating wounds, (see pages 149, 150.) Sometimes it is an effect of serious internal ophthalmia, arising from other causes. When the absorption commences, the globe loses its natural tension; it is soft and flaccid when felt through the upper eye-lid. A diminution of the ordinary convexity and prominence is obvious, when the lids are closed. The shrinking goes on till the organ is reduced to the size of a nut or a bean, in which we still perceive the proper component parts of the eye in miniature. There is a perfectly transparent cornea, not larger than a grain of wheat, with an iris behind it, of which the pupil is closed. The state of atrophy, which only takes place when the internal textures have been so changed as to destroy vision, is not an unfavourable termination, inasmuch as the shrunk globe is no longer subject to inflammation, and therefore never produces in that way, or by sympathetic influence on the sound eye, those inconveniences which are often experienced from staphyloma, or hydrophthalmia. There is no remedy for atrophy of the globe. We can neither arrest the progress of absorption, nor restore the diminished eye to its normal dimensions.

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* *Treatise*, &c., p. 418.

Collapse of the globe from suppuration.—Atrophy is quite a different state from the diminution of the globe consequent on general suppuration of its interior, which has been called, *phthisis*, or *consumptio purulenta oculi*. In the latter case, the coats collapse, and the eye shrinks to a small size, the cornea being scarcely, if at all, distinguishable. The small tubercle, to which the shrunken eye is now reduced, is subdivided into four parts by four superficial impressions, corresponding to the situation of the four recti muscles, and meeting together in the centre. The same collapse of the tunics, and fourfold division of the tubercle, which they form, is seen after escape of the humours consequent on sloughing, general suppuration, or extensive ulceration of the cornea, as in purulent or gonorrhœal ophthalmia; also after the operation for staphyloma or hydrophthalmia.

In a collapse of the coats from suppuration, the deformity may be remedied by wearing an artificial eye. I have not seen this proceeding adopted in cases of atrophy. BEER[*] says, that it is prejudicial in such instances, and that the mechanical

[*] *Lehre*, vol. ii. p. 271.

irritation of the foreign body causes pain and more rapid diminution of the globe.

After general suppuration or extensive ulceration of the cornea, the remains of the texture, which are opake, adhere to the iris; the anterior chamber is abolished, and the front of the eye is flattened. This state has been called *consumptio purulenta corneæ*. If the united iris and cornea are pushed forwards by the collection of aqueus humor behind, staphyloma is produced.

SECTION IV.—EXOPHTHALMIA AND PROTRUSION OF THE GLOBE.

When the eye is pushed out of the socket, and more particularly when it has been thrust between the lids, so as no longer to be covered by them, the case is called *exophthalmia:* it has sometimes been denominated *proptosis*. The eye may be suddenly displaced by a penetrating wound with the introduction of a foreign body into the orbit, (see p. 132;) it may be more gradually protruded by suppuration in the orbit, or by changes of obscure nature in the parts behind it; and a still slower displacement may result from enlargement of the lacrymal gland, from adventitious growths of various kinds within the orbital cavity, from disease of its parietes, or from preternatural growths originating in the neighbourhood and making their way into the cavity. Further, the eye may be so enlarged by the various malignant diseases, or by dropsical distension, as to project between the lids. Thus it appears that exophthalmia is not a particular disease, but merely a change of position, which may be produced by various dissimilar causes. The term denotes an effect, but gives us no clear information respecting the cause.

BEER proposes to call the affection *exophthalmus*, when the protruded eye is in its natural state; *exophthalmia*, when it is inflamed; and *ophthalmoptosis*, when the displacement is caused by division of the nerves and muscles of the orbit, or by paralysis of the latter.

I have mentioned the displacement of the globe, in describing the symptoms of those affections, to which it is incidental. I shall therefore now advert shortly to those cases only, in which the causes producing it are obscure.

CASE I. *Partial protrusion of the left eye-ball, after erysipelas of the face consequent on fever.*—CHARLES HUTTEN, a sailor, aged forty-two, was received into the London Fever

Hospital on the 10th of July, 1831, labouring under feverish symptoms, which had commenced without any obvious cause, three weeks before. On the 3rd of August, as he was recovering from the fever, erysipelas of the face came on. The palpebræ were considerably swollen on the 6th, although the parts affected with the erysipelas were not much reddened. The eye became slightly protruded on the 12th, the erysipelas having disappeared on the preceding day. He was admitted into St. Bartholomew's Hospital on the 16th, when the projection of the globe had considerably increased. The left eye was now more prominent than the right by three quarters of an inch. The conjunctiva covering its lower half, considerably distended with serous effusion, overlapped the under lid, so as to present, at first, the appearance of ectropium. No inflammatory symptoms were present: the eye and orbit were free from pain; vision was a little impaired. The patient, being weak, was placed on broth diet: a rag dipped in cold water was applied over the lids and brow. A saline aperient draught was directed occasionally. 22nd. Twelve leeches near the eye. 7th September. The eye has regained its natural position and aspect. Vision is perfect; a small glandular tumour is seated below the jaw; six leeches to the swelling, and poultice afterwards. 14th. Discharged perfectly well.

CASE II. *Protrusion of the eye-ball, with impaired vision.* RICHARD GILBERT, a healthy young sailor, thirty years of age, came under my care, at the London Ophthalmic Infirmary, on the 14th of February, 1826, with the complaint above mentioned. The displacement had come on gradually, and had not existed long; without being considerable, it was quite conspicuous, and produced an unpleasant appearance and expression. The health was perfectly good. Blood was twice abstracted by cupping; mercurial alteratives and aperient medicines were afterwards administered and continued till May. He was then dismissed cured, with vision perfectly restored, and the globe nearly in its natural position.

I have seen some instances, in females, of protrusion of the globes, so that the palpebræ would not come together. The eyes, unusually denuded in front, have had an unpleasant appearance of enlargement and projection. Surgical treatment has alleviated the symptoms and checked the progress of the complaint, without entirely removing it.

"In some instances," says Mr. WARE, "a projection of the eye appears to be occasioned solely by a morbid accumulation of the substance on which the eye rests in the orbit. The repeated application of leeches on the temple and forehead, has been found of great use in subduing this morbid tendency. In one case, that came under my own care, the projection was speedily diminished by opening the temporal artery; and, after the hemorrhage had ceased, by converting the orifice into an issue, the discharge from which became soon very considerable. In another case, in which the protrusion occasioned great pain, and nearly destroyed vision, a perfect cure was accomplished by the application of a large caustic behind the ear. The discharge which it occasioned, when the eschar separated, was profuse; and it was kept up nearly a month, by the insertion of a dozen peas daily."*

"I have occasionally met," says Mr. **Travers**, "with cases of proptosis to such an extent, as to occasion a morbid change upon the cornea, with a varicose state of the vessels of the conjunctiva; and with others in which, although the cornea remained clear, the vision was materially deranged, when the cause of the protrusion was altogether obscure, and the progress of the disease had been so slow as to occupy a period of several years. In these cases both eyes are equally affected; they are attended with a distressing degree of deformity, obtuse pain in the forehead, and other occasional signs of determination of blood to the head. It is probably a morbid increase of the adeps contained in the orbit, obstructing its circulation, as well as protruding the eye-ball."†

SECTION V.—OSSIFICATIONS OF VARIOUS PARTS OF THE EYE.

Most of the textures belonging to the eye, if not all of them, have been found converted into bone, more or less extensively; the change having seldom been observed, except in eyes which had been seriously disorganized by acute inflammation many years before death, and had then remained collapsed, shrunk, or at all events deprived of vision. The subject therefore, generally speaking, is of no practical importance. The recorded instances of these ossifications have been, for the most part, collected by **Schön**, in his work on the Pathological Anatomy of the Human Eye;‡ and some of the following references have been borrowed from him.

Cornea.—In the opake cornea of an eye changed in form, Mr. **Wardrop** found, between the laminæ, a small piece of bone. Another was found between the choroid and retina of the same eye. In another case, Mr. W. found gritty particles and inequalities on the internal surface of the cornea. In another case, communicated to him by Mr. Anderson of Inverary, a substance of whitish appearance was seen in the under part of the globe of the eye, arising from the inside of the sclerotic coat, and extending upwards behind the cornea, over a great part of the iris to very near the pupil. It had begun to grow fifteen years before, in consequence of a blow on the eye from a fall, and had been attended with much irritation and pain, which had increased so as to render relief by operation necessary. Mr. Anderson therefore made a section of the cornea, as in extraction of the cataract, and then readily turned out a small piece of bone, which was as thin as paper above, thicker, porous, and brittle below. It adhered slightly in the lower part, but was unattached above.[*]

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* *Observations on the treatment of the Epiphora, &c.* p. 295.

† *Synopsis*, p. 411.

‡ *Handbuch der pathologischen Anatomie des menschlichen Auges*; 8vo. Hamburg, 1828.

Walther found a small piece of bone in the cornea of a man, sixty years of age.[†]

A case recorded by Monod,[‡] of ossification of the entire cornea, in an old man, is mentioned by Schön, as the only instance of the kind.

Sclerotica.—According to Schön, only one instance has been observed: it is recorded by Blasius in a rare work.[§]

Choroid coat.—"I have met," says Mr. Wardrop, "with a few instances where a thin cup of bone was found between the sclerotic coat and the retina. The ossifications in all these cases were exactly similar. At the bottom of the cup, there was a small round perforation, through which the retina passed to expand on the interior surface of the osseous shell. The retina was in immediate contact with the interior surface of the bone, but between the sclerotic coat and the ossification there was a very thin, tender, and pale-coloured membranous expansion, the only vestige of the choroid coat."[‖]

Walther found the posterior half of the choroid ossified in the eye of a man thirty years old, who had been long blind; the eye being in other respects healthy. In a man of sixty, who had been blind twenty-eight years, the globe was collapsed, and the interior portion of the choroid ossified. In another instance, where the bulb was diminished, the choroid formed a firm excavated hemisphere, in which there was a hole for the passage of the optic nerve. In an older man, the choroid was completely ossified in both eyes.[*]

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[*] *Essays on the Morbid Anatomy of the Human Eye*; vol. i. chap. 10; p. 74—77.

[†] *Anat. Museum*, Th. i. p. 139. No. 274.

[‡] *Nouvelle Bibliothêque Med.* May, 1827.

[§] *Observationes medicæ rariores*; Amstelod, 1677; p. 78.

[‖] *Lib. cit.* vol. ii. p. 69; plate xiv. fig. 3.

Iris.—Two instances of its ossification are mentioned by Walther.[†]

Retina.—Ossification of this part has been already mentioned in two notes at page 505. Schön speaks of this change as a rare occurrence, and quotes, besides an instance mentioned by Morgagni, (*Epist.* xiii. No. 10;) another related by Zinn in the *Hamburg Magazine*, vol. xix. p. 441.

Lens and capsule.—I have already mentioned incidentally that these parts are subject to osseous change; (see pp. 401 and 406.)

Mr. Wardrop met with a partial ossification of the lens. When it was divided, the "central portion was found converted into a hard bone. The external laminæ of the lens were soft, but those nearer the centre became more consolidated, the central portion itself being of a deep brown colour, perfectly osseous, and exhibiting a laminated structure."[‡]

I have mentioned, at page 406, that the crystalline capsule may become cartilaginous or bony. Mr. Gibson found partial ossification of the capsule in a case, on which he was operating; "it felt gritty to the couching-needle, and produced a noise, as if the instrument passed over a piece of dry parchment."[§] Mr. Wardrop has seen several examples of complete ossification of the capsule, which has sometimes retained its natural form, and contained an opaque lens, while in other cases it has been shrivelled, and the lens partially or completely absorbed. The ossified capsule has sometimes been thin and brittle; in other instances thicker and firmer. He has "met with it in eyes where there was ossification of the choroid coat; in eyes where the hyaloid membrane was converted into bone; in some cases of fungus hæmatodes and in staphyloma."[‖]

Membrane of the aqueus humor.—Mr. Wardrop saw a case, in which thin laminæ of bone, which he supposes to have been formed in this membrane, were discharged from the anterior chamber through ulcers formed in the cornea. He mentions, that in a patient, under the care of Mr. Wishart, that portion of the capsule of the aqueus humor, which is reflected over the iris, was almost entirely converted into a bony shell.[¶]

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[*] *Lib. cit.* Nos. 292, 293, 294, 295.

[†] *Lib. cit.* p. 146 and 148.

[‡] *Lib. cit.* p. 96, 97. Plate xi. fig. 5.

[§] *Practical observations*, &c. p. 121.

[‖] *Lib. cit.* p. 114—117. Plate xi. fig. 6. Plate xiv. fig. 1 and 2.

[¶] *Lib. cit.* p. 18.

Vitreus humor.—This humour and the membrana hyaloidea may become ossified. "In one case," says Mr. **Wardrop**, "besides the capsule of the lens being ossified, I found several large, but thin, scales of bony matter, dispersed in an irregular manner throughout the vitreus humor, which, in all probability, were ossifications of the hyaloid membrane." In another eye, extensively disorganized by serious disease, and shrunk, the cavity of the globe, within the choroid and iris, was occupied by an irregularly-shaped bony mass, composed of two distinct portions, slightly connected. The anterior was spherical, and consisted of a thin hollow shell of bone: it appeared to be the capsule of the lens ossified. The other, occupying the situation of the vitreus humor, was unequal in the surface, and composed of numerous osseous laminæ irregularly disposed.*

Section VI.—Calculous concretions.

Calculous concretions have been met with in the eye. **Scarpa** has described and delineated an adventitious formation of this kind. The globe was shrunk to one half its natural size. The sclerotica and choroid were nearly natural. Within the latter, there were two calculous, cup-like substances (*scodelle*,) of which one occupied the back of the eye, the other was in the situation of the ciliary body and the lens. The optic nerve, degenerated into a thread, went through an opening in the centre of the posterior calculous portion, and was then continued as a soft cylinder, through the axis of the globe, and was fixed to the anterior calculous mass.†

Haller met with a similar change of structure, which he has described in his *Opuscula Pathologica*, Obs. 65, under the title of *lapideus scyphus in oculo*, that is, a cup-like calculous concretion in the eye. In dissecting the nerves of the eye, he observed that the cornea was opaque, and the globe hard. "Within the choroid, and concentric with that tunic, in place of the retina, there was a hollow, osseous, or rather stony hemisphere, for no bony fibres were discernible, to which the choroid adhered, as it usually does to the retina: it consisted of two layers, and was excavated on one side so as to form two small recesses. That this sort of cup was the retina, in an indurated state, was further proved by the circumstance of its being perforated by an accurately round opening at the entrance of the optic nerve. No proper vitreous body was found in this osseous cavity, but a kind of nerve, that is, a white cylinder, which entering through the foramen of the bony cup, passed along its axis, and adhered in front to a confused mass of bone, which might have been taken for a degenerated crystalline. In this same mass, the iris, ciliary processes, and cornea, were firmly consolidated."*

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* *Lib. cit.* p. 128, plate xiv., fig. 1.

† *Saggio di Osservazioni e d'Esperienze, &c.* cap. xx., plate ii., fig. 8. *Treatise*, &c. p. 534. The morbid structure is delineated in plate ii. fig. 8.

PANIZZA minutely examined an eye, which contained a large calculous formation between the choroid and retina; a description and good delineation of the parts are given in his work on fungus hæmatodes of the eye.† The left eye, in which vision had been lost in youth from internal inflammation, was taken from the body of a farmer, sixty years of age, who had died of peripneumony. The cornea was opaque, flattened, and shrunk; the globe generally was rather diminished, and firm to the touch. When the sclerotica and choroid, which were natural, had been cut through, a white, stony, and somewhat rough substance was exposed, covering the globe completely within the choroid, and connected behind, at the entrance of the optic nerve, by a small white cord, which was the nerve passing through an opening in the calcareous substance. In front, the latter, the iris, cornea, and lens, which was diminished and stony, were consolidated into one mass. A portion of the calcareous stratum, including part of the opening for the passage of the retina, was broken away to expose the interior. It was hard and brittle externally, about a line in thickness, and disposed in layers, of which the internal were less firm and at last almost membranous. The cavity was filled with a whitish gelatinous substance deposited in laminæ. In the midst of this the retina was found contracted and folded together, ending behind in the thin cord which passed through the calcareous shell, and spreading out in front into a broad attachment, connecting it to the ciliary body. An incision was made into the conical portion of the retina, and the edges separated. The cavity contained the vitreus humor, shrunk, folded, and reduced into a small conical mass.

A specimen in the museum of St. Bartholomew's hospital resembles very nearly the two examples of disease last mentioned. Within the sclerotica and choroid, which are healthy, there is a cup-like, calcareous deposition, a line in thickness; its exterior surface, which was in contact with the choroid, is a little rough; the interior concavity is smooth. I do not know what it contained internally, nor whether it was perforated by the optic nerve. It was an old, diseased eye.

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* *Opera minora*, tom. iii. p. 366, 367.

† *Sul fungo midollare dell' occhio. Appendice*; Pavia, 1826. P. 22, 23, tab. i. fig. 7.

SECTION VII.—ENTOZOA *(internal or parasitic animals) in the eyes of man and of other vertebralia.*

It has been long well known that a species of filaria (thread-worm) is occasionally found in the anterior chamber of the horse's eye, moving rapidly about in the aqueus humor. The circumstance, though rare in these climates, is by no means uncommon in India, where it is only seen during the cold months, not having been observed before the beginning of October, or later than the end of February, or the commencement of March. The heavier the rains have been during the periodical rainy season, and particularly towards its close, the more numerous have cases of worm in the eye been during the subsequent cold season. They occur chiefly in low districts, being hardly known in the upper provinces, where the soil and climate are drier. Mr. GIBB, surgeon to the East India Company's stud at Poonah, used to see about twenty cases annually. Thirty cases occurred in one season at Poonah among the young stock, while in another depôt, situated higher (Ghazepoor,) not a single case occurred during the same time. Two worms have sometimes, but rarely, been seen in the same eye at one time; and a second worm has made its appearance in an eye from which one had been extracted some months before. Similar worms are met with in the stomach and intestines of the horse; also, according to some reports, in the cellular substance of the loins. The animal, which has received the name of *filaria papillosa*, is about an inch long, equal in size to a sewing-thread, white or darker coloured. It causes inflammation of the eye, with uneasiness, watering, and turbidity of the anterior chamber. Opacity of the cornea comes on, and blindness ensues. These results may be prevented by extracting the animal. A small incision is made in the cornea with a lancet, and the worm comes out with the aqueus humor.*

* *On the worm found within the eye of the horse*, by P. BRETON, Esq. *Observations on the filaria or thread-worm found in the eyes of horses in India*, by

This worm has been seen in the horse's eye in Europe.[*]

In the work just quoted, Dr. Nordmann, of Odessa, describes the circumstances which led him to discover the existence of entozoa in the eyes of several vertebralia; and he gives a minute account of them, illustrated by beautiful figures, representing their form and internal structure. His researches, which were carried on during eighteen months, from March 1830 to September 1831, embraced numerous eyes of horned cattle, sheep, pigs, frogs, lizards, and fishes, with some from the human subject, and birds. He found entozoa of the genus *filaria* in the human eye, and in that of the gadus æglefinus (hadock,) of the genus *ascaris* in the frog, of the genus oxyuris in the perch, of the genus cysticercus in the pig, and *trematoda* in great abundance in other fishes. The genera examined for this purpose were muræna, gadus, perca, gasterosteus, cobitis, silurus, cyprinus, salmo, esox, pleuronectes. In the fish he first found entozoa in the vitreus humor, but he subsequently met with them in the crystalline, between the lens and its capsule, between the laminæ of the cornea, in the iris and retina, in the choroid gland, between the sclerotica and retina, and in the aqueus humor.[†] In the crystalline lens of some fish they are so numerous as to render it more or less opaque, and thus to impair or injure sight.[‡]

A species of filaria (*filaria medinensis?*) has been seen under the conjunctiva oculi in the West Indies. Schön has quoted some facts of this kind. A case was related to him by Dr. Gaertner, who had resided long in the West Indies. A blackish thread-like streak, which moved, was seen in the conjunctiva of a negro girl. In a little time it had disappeared, and a slender bluish line was observed in the upper eye-lid. It appeared like a small cutaneous vein, and moved in various directions. Dr. Gaertner considered it to be the guinea-worm: he made an incision, and extracted the animal.[§]

Dr. Nordmann examined two lenticular cataracts, taken

W. Twining, Esq. In *Transactions of the medical and physical society of Calcutta*, vol. i. A short statement of Mr. Twining's observations will be found in the *Edinburgh Medical and Surgical Journal*, vol. xxv. p. 240, 241.

[*] Nordmann, *Mikrographische Beiträge zur Naturgeschichte der Wirbellosen Thiere*; Erstes Heft, p. 11—13. A delineation of the worm is given by Gurlt, in his pathological anatomy of the horse.

Leuckart has collected all that is known respecting this *filaria* of the horse's eye in his *Versuch einer naturgemassen eintheilung der helminthen*, Heidelberg und Leipzic, 1827, p. 28, 29.

[†] *Lib. cit.* p. 1—6.

[‡] *Lib. cit.* p. 19, 20.

[§] *Handbuch der pathologischen anatomie des menschlichen auges*, p. 226, 227.

from an elderly man, half an hour after they had been extracted by Professor Von Graefe. In one of these, which was still partially surrounded by the capsule, he observed in the Morgagnian fluid two very small and delicate rings, which he clearly recognized under the microscope as convoluted filariæ. One of the two had been injured in the middle, probably by the cataract needle, so that the intestines had come out of the body, and were visible as slender threads. The other was uninjured, of uniform thickness, three quarters of a line long, and extremely narrow. It was spirally convoluted and completely dead. A simple intestinal canal, a mouth without visible papillæ, an uterus, and a prominent anal aperture, could be distinguished. In the other lens, which, as is usual, was completely free from the capsule, nothing similar could be discovered. Dr. Nordmann calls this entozoon *filaria oculi humani*. He adds, that he had since examined several cataracts, and human eyes under various circumstances, without discovering any entozoa.*

In a second part of the same work, the author recites two additional instances of entozoa found in the opaque lens. He says, "In the month of May, 1832, I was present at two operations of extraction performed on old women by Professor Juengken. I found a living filaria, five lines and a half long, in the act of casting its skin (in der häutung begriffene,) in one lens of the first patient, a case of green lenticular cataract. No extraneous living body was discovered in the other lens. The second case was more interesting, as it presented the first example of microscopical entozoa possessing suckers, (*Trematoda*, Rudolphi,) being found in the human eye; eight individuals of the genus *monostoma* were found in the substance of the lens. These minute beings were situated in the upper strata of the crystalline; they were one-tenth of a line long, and moved sluggishly when placed in warm water. The examination took place immediately after the operation. In both cases the opacity was not yet complete, and the lenticular substance was soft."†

Dr. Gescheidt and Professor Von Ammon found, in the crystalline lens, four entozoa of the genus *distoma*, in a case of congenital cataract.‡

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* *Lib. cit.* p. 7, 8.

† *Lib. cit.* Zweites Heft; Vorwort, p. 9.

‡ *Zeitschrift für die ophthalmologie*, vol. iii. p. 75, 76.

Cysticercus cellulosæ in the anterior chamber of the human eye.—This hydatid, consisting of a small globular vesicle, with a slender neck, of which the end is a little enlarged, so as to form a kind of head, which is found all over the body of the domestic pig under certain circumstances,* occurs also in the eye of the animal, where it has been seen both in the anterior and posterior chamber. It has been twice observed in the anterior chamber of the human eye, floating in the aqueus humor. Dr. W. Soemmerring communicated the first instance to the assembly of German naturalists at Heidelberg, in the year 1829; it was published in the *Isis*, 1830, p. 717, from which Dr. Nordmann has taken the following account.

"A living *cysticercus*, of the size of a vetch, was formed in the anterior chamber of the left eye of a girl eighteen years old, and otherwise healthy. It was said to have shown itself after an acute inflammation of the organ. I saw, and delineated it, two months afterwards, when no trace of inflammation remained, excepting a slight blush of red round the cornea, on excitement of the organ. It caused no pain, or merely a transient uneasiness when it moved considerably; and interfered with sight only when it came before the pupil. Usually it lay at the bottom of the anterior chamber, like an imperfectly dissolved lens, where it appeared as a partially transparent sphere, from which there was, at one point, a milk-white opaque prominence. In this situation the thick wrinkled portion of the neck occasionally projected, sometimes spontaneously, sometimes in consequence of gently rubbing the upper eye-lid. Then slowly came out the thinner thread-like half, ending in a head with four suckers and a double circle of hooks. (The latter circumstances, however, were not distinguished till the animal, after extraction, had been examined with the microscope.) The body of the animal changed its figure, more or less quickly, from the ordinary globular to an oval or pyriform shape. It generally lay half a line from the margin of the cornea, on account of the narrow interval between the two parts at their circumference. The neck hung downwards like a leaden plummet; it was not attached, but moved freely, and changed its position accord-

* The pigs, in whom these hydatids or cysticerci are found, are said to be *measled*; and their flesh is called *measly* pork. The French term the affection *ladrerie*; while the Germans call these parasitic creatures *Finnen*. Hence Blumenbach has derived the name of *hydatis finna*, under which he has described this hydatid, in his *Abbildungen Naturhistorischer Gegenstände*, No. 39, with an engraving of the creature, both of the natural size, and in an enlarged view.

ing to the movements of the head, always passing downwards. In the course of seven months it had become twice as large as when first observed, and had attained the magnitude of a pea, when it was extracted alive by Dr. SCHOTT, through a small incision of the cornea. It was put in lukewarm water, and continued to move more than half an hour; it then became gradually opaque and white, and we could plainly distinguish with the microscope the four prominent suckers with their orifices, and the double circle of hooks in the middle of them. As it corresponded in all respects, not only with the delineations of GÖZE and BREMSER, but with other similar specimens from the human body, which I compared with it, I could have no hesitation in considering it as a *cysticercus cellulosæ*, which, so far as I know, has never been observed in the human eye, although, according to VAN DER HOEVEN, it is found in that of the pig." *

The case of another patient, in whose eye there is a living cysticercus, has been recently published, by Mr. LOGAN of New Lanark, in a pamphlet which I have not seen. A description of the appearances, illustrated by two wood-cuts, has been sent to the *London Medical Gazette*,† by Mr. MACKENZIE of Glasgow. The disease exists in a lively and otherwise healthy girl, seven years of age. From the month of August, 1832, to the following January, there had been repeated attacks of inflammation in the left eye, which had rendered the cornea nebulous, and still continued so severe as to threaten loss of sight: the inflammatory symptoms, however, subsided, leaving a slight opacity of the cornea. "After a week, the child was again brought to Mr. LOGAN, who, on examining the eye, discovered, to his great surprise, a semi-transparent body, of about two lines in diameter, floating unattached in the anterior chamber. This body appeared almost perfectly spherical, except that there proceeded from its lower edge a slender process, of a white colour, with a slightly bulbous extremity, not unlike the proboscis of the common house-fly. This process Mr. L. observed to be of greater specific gravity than the spherical or cystic portion, so that it always turned into the most depending position. He also remarked that it was projected or elongated from time to time, and again retracted, so as to be completely hid within the cystic portion, while this, in its turn, also assumed various changes of form, explicable only on the supposition of the whole constituting a living hydatid." Mr. MACKENZIE found the cornea slightly nebulous: he adds, "When the patient kept her head at rest, as she sat before me, in a moderate light, the animal covered the two lower thirds of the pupil. Watching it carefully, its cystic portion was seen to be more or less spherical, and then to assume a flattened form, while its proboscis I saw at one moment thrust suddenly down to the bottom of the anterior chamber, and at the next drawn up so completely as scarcely to be visible. Mr. MEIKLE turned the child's head gently back, and instantly the hydatid revolved through the aqueus humor, so that the proboscis fell to the upper edge of the cornea, now become the more depending part. On the child again leaning forward, it settled like a little balloon in its former position, preventing the patient from seeing objects directly before her or below the level of the eye, but permitting the vision of such as were placed above." As the child is healthy, and the eye free from inflammation, it has not been thought advisable to institute any treatment in reference to this parasitical inhabitant of the anterior chamber.

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* *Lib. cit.* Erstes Heft, p. 8, 9.

† Vol. xii. p. 110—112.

CHAPTER XXVIII.

DISEASES OF THE ORBIT.

Inflammation and suppuration.

PHLEGMONOUS inflammation and abscess may occur in the cellular texture behind and around the globe. If, according to some descriptions, the affection should be combined with inflammation of the globe, the combination must be very rare; for I have not seen an instance of it.

When we consider the vascular and nervous structures which compose the contents of the orbit, their close contiguity with the sensorium; further, the direct membranous continuation between the periorbita and the fibrous sheath of the optic nerve on one side, and the dura mater lining the cavity of the cranium on the other, we shall not be surprised to find that inflammation of the orbital contents is characterized by the most violent and agonizing pain deeply seated in the orbit, extending over the whole of the head, and accompanied by a sensation of tension and bursting, as if the contained parts were too large for the cavity in which they are lodged. As the bony socket cannot give way, the swelling of the parts behind pushes the globe forward, distending the lids, and making them unnaturally protuberant. The inflammation soon extends to the palpebræ, which become red and swollen by œdematous effusion. The slightest attempt to move the eye excites acute pain, and the patient therefore keeps the organ perfectly still. In conjunction with the local symptoms, there is violent inflammatory fever; the patient is delirious at night, and continues so for several nights in succession. As the disease proceeds, all the symptoms are aggravated to a pitch which is almost intolerable. The globe of the eye is thrust further out, often beyond the palpebræ. Under such circumstances the retina is rendered insensible to light. The pain intermits a little; throbbing and rigors are felt; suppuration takes place, and an abscess is formed, without, however, any material relief to the patient, since the bony parietes of the orbit cannot yield. Ultimately the matter makes its way to the surface, either presenting at some part of the orbital margin, or under the lid, in which latter case it pushes forwards the fold of conjunctiva passing from the lid to the globe.

BEER[*] has described this affection as involving the globe of the eye, together with the surrounding soft parts. Should such a combination occur, symptoms denoting inflammation of the external and internal tunics of the eye will be added to those already described. The eye is thrust out, the sclerotica becomes red, the conjunctiva is inflamed, the iris changes its colour, and the sufferings of the patient are of course aggravated.

Now, what is to be done in a case of this kind? If we see it in an early stage, the violent pain, and the general febrile disturbance clearly point out the necessity of vigorous antiphlogistic treatment. When the presence of fluctuation shows that matter has formed, an opening should be immediately made into the collection; by this proceeding we shall relieve the patient, and limit the extent of the local mischief. When the symptoms point out that matter has formed, although we may not feel fluctuation, it is best to make an opening by means of a lancet or double-edged bistoury in the situation where the matter appears to be deposited, taking care not to injure any part of consequence.

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[*] *Lehre*, vol. i. § 346—353. He states that it is one of the most uncommon forms of ophthalmic inflammation (p. 340,) and that the prognosis, even in the first period, is never favourable, at all events very uncertain (p. 344.) The affection was not of this formidable character in the cases detailed in the text; but it will be observed, that in them the globe was not involved.

Some time ago I saw two instances of this affection, in which the local and general symptoms were characterized by a degree of violence, which is seldom seen in other cases. One was that of a young man between twenty and thirty years of age; he came to me, accompanied by his wife, who told me that he had suffered such agonizing pain for three or four preceding nights, that she was afraid he would have gone out of his mind. In this case matter was presenting just, under the superciliary ridge; after making a free opening, a large quantity issued out, and a probe introduced at the puncture went to the bottom of the orbit.

In the other case, that of a child between three and four years old, the local and general symptoms were equally severe; the matter presented between the lower lid and the globe, but the quantity discharged on making an opening was not considerable. In both instances the globe of the eye was protruded, but not actually thrust out between the palpebræ; and after the matter had been discharged it receded to its natural situation. In the child, vision was restored; but in the adult, the eye, although it had not been inflamed, remained amaurotic.

The inflammation is sometimes of more chronic character, with less severe symptoms; matter forms, and advances to the surface more slowly. I saw a child, two years old, for an affection of the right eye, which was said to have existed for a week. The globe projected half an inch further than the left, and was pushed outwards. The internal angle, the neighbouring part of the lids, and the side of the nose, were red and swelled. On careful examination, I thought that deep-seated fluctuation was obscurely perceptible; the gentleman who accompanied the patient could not feel it. The child had not suffered much; its rest had not been interrupted. Leeches had been applied twice. From a consideration of the history and symptoms, I concluded that suppuration had taken place in the orbit, and that an opening ought to be made. I accordingly punctured with a lancet, which entered to the depth of three quarters of an inch, when a dessert spoontul of thick well-formed pus flowed out. A small bit of lint, spread with simple cerate, was introduced to maintain the opening. At the end of a week, the puncture had closed; the eye had regained its natural position; and the swelling at the internal angle had disappeared.

Mr. WARE has observed, that the suppuration in these cases is sometimes slow, so that, if the matter be deep-seated, the eye will be protruded before fluctuation is discovered. In a child, six years old, thus affected, he says, "I passed a lancet on the side of the eye next the nose a little below the commissure of the eye-lids, at least an inch into the orbit, before I reached the matter. On withdrawing the instrument, its point was evidently marked with pus. I therefore enlarged the matter with a blunt-pointed bistoury, and discharged a considerable quantity, which was thick and putrid. It was necessary to preserve the opening by the insertion of a small dossil of lint; on the removal of which, a vent was given daily to new matter for a fortnight. Its quantity gradually decreased, together with the prominence of the eye; and at length it wholly ceased, the wound healed, and the child became well. The motion of the affected eye, however, was not quite free towards the nose for several months afterward."*

Inflammation in the orbit, when it involves the fibrous membrane lining the bone, may extend to the dura mater, and matter may find its way to the foramen opticum; thus serious and fatal disease may be excited within the cranium. The possibility of such an occurrence renders it imperatively necessary to use active antiphlogistic means in the first instance, and to evacuate matter as soon as we can satisfy ourselves of its existence. A case mentioned by BORSIERI illustrates these points. A lady, twenty-five years of age, was seized with acute pain in the left side of the head, which lasted fifteen days. At length the left eye became red and swollen, and, in a few days, the eye-lids and neighbouring parts formed a large red swelling, which was attended with considerable feverish disturbance. Antiphlogistic measures were adopted, but suppuration occurred in a few days, and a large quantity of fetid pus came out of a spontaneous opening near the external angle of the eye. The swelling now subsided, so that the eye could be seen. The conjunctiva was intensely red, and very tumid, the cornea transparent, the pupil dilated, and vision destroyed. On the fourth day after the rupture of the abscess, general and strong convulsions came on, followed by paralysis of all the limbs, loss of the senses, languid and stertorous respiration, small and intermittent pulse, and death. The space between the globe and the orbit was filled with fetid pus, which extended also under the eye-lids and cheek. The left anterior lobe of the brain had suffered by suppuration almost as far as the lateral ventricle. The optic nerve was surrounded with pus, but not diseased: the matter communicated with the cavity of the orbit.[*]

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* *Observations on the treatment of the Epiphora*, &c. &c. 1818. p. 292—293.

In a case recorded by Mr. GUTHRIE, of a bayonet wound, followed by inflammmation of the orbit, and of the eye-ball, the latter "was protruded, the lid could not be raised so as to explore the eye, which was highly inflamed; chemosis had taken place, vision was indistinct, the iris was discoloured, the pupil contracted, the pain was excruciating, both in the eye, which felt as if it were too large for the orbit, and all over the forehead and temple of that side; flashes of light, of various colours, darted through the eye, in consequence of the surrounding pressure upon it; the swelling increased, the patient became delirious, and an abscess burst in the upper eye-lid on the fourth day, without any alleviation of the symptoms. He soon after became comatose and died, I have little doubt, from the formation of matter within the head. The eye had previously been lost by sloughing of the cornea."[†]

"I have known," says Mr. MACKENZIE, "deep-seated abscess of the orbit to prove fatal, the patient having for a day or two shown symptoms of pressure on the brain, and in fact dying apoplectic."[‡]

The protrusions of the globe mentioned in the preceding chapter, belong properly to this place; they must be referred to disease in the soft parts behind the eye.

Tumours in the orbit.—The cellular texture in the orbit, like that in other parts, may become the seat of the various adventitious growths called tumours. These may be sarcomatous, steatomatous, or encysted, the latter being met with much more frequently than the two former kinds. The encysted tumours may contain watery fluid, a viscid fluid like white of egg, or various thicker matters, so as to come under the technical denominations of meliceris, or atheroma: in two or three recorded instances they have contained hydatids. From the limited space which the orbit affords for their increase, these productions interfere with the other important contents of the cavity, and often seriously injure the optic nerve or the globe by their pressure. They may arise in various parts of the cavity, and grow not unfrequently at some distance from its anterior aperture. As they enlarge, they push the globe forwards, and stretch the optic nerve, at the same time displacing the former downwards, upwards, or outwards, according to the part of the cavity in which they are produced. Ultimately they may thrust the eye out of the orbit and between the lids, so as to cause complete exophthalmia. According to the degree of pressure and displacement, imperfection or loss of sight takes place. Sometimes they are attended with pain from the first; in other cases we do not suspect the disorder until sensible displacement of the globe, and impaired vision have occurred. Finding no other sufficient cause for these symptoms, we carefully examine the anterior aperture of the orbit, when we may be able to discover obscurely the presence of a swelling. The enlargement of this, with the aggravation of the other symptoms, in process of time renders the nature of the affection unequivocal.

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[*] *Institut. Medicinæ Practicæ*, vol. iii. p. 14–16, note.

[†] *Lectures on the operative surgery of the eye*, p. 146.

[‡] *Practical Treatise*, p. 34.

When the existence of a tumour in the orbit has been ascertained, the most advisable course, indeed the only effectual means of removing the complaint in the great majority of instances, is that of extirpation by a surgical operation. The sooner this is accomplished the better. The growth of the disease, and its consequent pressure on the globe and optic nerve, may not only thrust the eye out of its socket, with more or less considerable deformity, and injury or loss of sight, but may also cause absorption of the orbit, at its upper part, and thus interfere with the brain.

The mode of proceeding in the operation will vary according to the position and size of the tumour. If it should not be large, nor extend deeply in the cavity, an external incision may be made through the integuments near the edge of the orbit, and parallel to the course of the fibres of the orbicularis. This incision should be ample, in order to facilitate the exposure and dissection of the tumour. In some instances, when the swelling is large, it may be necessary to resort to the expedient of slitting up the external canthus, as in the extirpation of the globe, and to remove the tumour from the inside of the lid. We must then detach it from its surrounding connexions by a cautious dissection, keeping the knife close on the surface of the tumour, that the neighbouring parts may not be injured. As the wound is deep when we come to the back of the tumour, and speedily fills again with blood after sponging, the operation is conducted by feeling and anatomical knowledge, rather than by sight. The danger and difficulty, however, are not considerable enough to induce us to follow the example which some have set, of separating the part behind by dragging with the fingers or by the blunt silver knife. We must proceed slowly, and the object may then be accomplished with the ordinary scalpel without risk. A strong ligature passed through the swelling, when it is exposed, will give us a firm hold of it, and facilitate the detachment. If the hemorrhage should continue after the operation has been concluded, the patient should go to bed, and have the lids and neighbouring parts sponged with cold water until the blood ceases to flow. The edges of the wound may then be approximated, either by means of sutures or otherwise; and the best dressing will consist of a soft rag kept damp with cold water, or a bit of lint thickly spread with spermaceti cerate. To fill such a wound with extraneous substances, such as lint or sponge, is the most likely way to produce secondary hemorrhage, or inflammation, and suppuration; it cannot answer any useful purpose. The impropriety of such proceedings in the treatment of wounds generally has been long recognized; why should a remnant of the ancient practice be preserved in wounds close to the eyeball, and very near the brain, and its membranes?

Induration of the adipous and cellular substance of the orbit.—A young man of thirty, previously healthy, came under my care in St. Bartholomew's Hospital, on the 4th of April, 1827. He had travelled from Brighton to London in an open cart, on one of the coldest days of the preceding January, and had suffered most severely. The left arm and leg were benumbed, so that he could not move them, and he did not recover the use of them for three or four days. He also experienced pain in the left eye; but in a fortnight the lids swelled and closed, with distracting pain in the eye and side of the head. He was in constant agony night and day, and he got no rest until he was completely exhausted by suffering. Cupping on the temple, repeated leechings, shaving and blistering the head, gave only partial and temporary relief. When he came to the hospital, the eye-ball was pushed forwards and upwards, projecting, by comparison with the other, about three quarters of an inch. The upper lid, slightly inflamed and protruded, could not be elevated by the patient. The lower lid was everted by a considerable swelling of the conjunctiva, which was red, and loaded with serous effusion. The globe was natural; the iris moved freely, but vision was so imperfect, that the largest letters could not be seen. Nothing issued from a deep puncture, made on the supposition of matter having formed in the orbit; but at the end of three or four days pus was discharged copiously. The pain now ceased, the swelling of the lids and the protrusion of the globe lessened, and sight improved, so that the patient could read small print. After some time bare bone could be felt towards the bottom of the orbit, and matter was discharged from the left nostril; on holding the nose and expiring, air came freely through the puncture. This subsequently closed, when the pain and protrusion of the eye returned; the latter indeed became more considerable than before, and vision was lost. In August another free incision was made, with temporary relief, and air again passed through the puncture. The probe entered deeply, and discovered a large excavation below the eye.

Severe pain about the orbit and side of the head continued; numbness of the cheek and jaw came on, with increased redness of the eye and lids, and greater protrusion, these symptoms receiving only a temporary alleviation from local bleedings and narcotics. The protrusion of the globe was now more than an inch; the pupil largely dilated, the iris motionless, and vision lost, except the mere power of distinguishing light from darkness. In November, the conjunctiva of the globe, which had hitherto remained nearly natural, became of a deep red, while the cornea lost its transparency, and then sloughed, the humours escaping, and the iris protruding in an irregular dirty-looking mass. The inflammatory, sloughing, and ulcerative process, by which the cornea had been destroyed, in this case, resembled what MAGENDIE has described as the consequence of dividing the nerve of the fifth pair in animals: it was probably owing to an analogous cause, as the morbid growth which caused the protrusion, must certainly have compressed, or otherwise injured the infra-orbital, and perhaps the ophthalmic branch of the nervus trigeminus. The evacuation and subsidence of the globe did not diminish the patient's sufferings, nor the external swelling, which, on the contrary, still increased. As the complaint had now been progressive for many months, in spite of active treatment, both local and general, and as the health, although in other respects good, was suffering under the constant severe pain, I proposed to remove the contents of the orbit, being persuaded that the operation afforded the only remaining chance of relief: the patient readily assented to the proposal, and the operation was performed on the 6th of December. The palpebræ were freely separated at their external commissure, and then turned aside, so as to expose fully the anterior aperture of the orbit, the entire contents of which were detached from the cavity, by dissecting close on the surface of the latter, first below, then above and at the sides, until the posterior connexion alone was left. The latter was then divided by a knife curved on its flat surface, the patient experiencing excruciating but momentary agony when the muscles and nerves were divided. The mass, which was hard, completely filled the orbit, so that the dissection was necessarily carried on close to the bone, and performed slowly. As the ophthalmic artery bled profusely, a conical compress of lint was introduced into the cavity, and held for some time on the vessel. This was removed in the evening without renewal of hemorrhage. The divided commissure of the lids was united by two sutures, and the tumid upper eye-lid closed the front of the orbit. He took thirty drops of laudanum at night. 7th. He slept at intervals, and passed a comfortable night; bloody fluid had oozed between the lids, but there had been no actual bleeding. The palpebræ are swollen, and bright red; the face is flushed, and he has slight head-ache, thirst, and foul tongue. (Twelve leeches round the margin of the orbit; saturnine lotion; a dose of calomel and jalap.) The inflammatory and febrile symptoms had disappeared on the next day, and the pain of the brow, head, and cheek, which had distressed the patient for so many months, was almost gone. Recovery now proceeded rapidly and uninterruptedly, the surface of the orbit granulating, and producing a vascular substance, which filled up a large part of the cavity; rest and appetite returned, and the patient soon regained his flesh, strength, and good looks. He left the hospital perfectly well on the 28th of December. The right eye, which had been sympathetically affected before the operation, regained its full strength.

The mass removed from the orbit consisted of the collapsed and shrunk eye-ball in front, with a hard and incompressible substance behind, extending to the point, at which the nerves and vessels had been divided. The recti muscles, unaltered in colour or texture, covered this substance, the exterior of which had the usual appearance of the orbital fat, except that it was more dense. An incision was carried from before backwards, directly through the centre of the entire mass. An apparently recent coagulum of blood separated the sclerotica from the choroid coat, the latter, with the retina, being compressed by the coagulum into a thick cord, extending from the optic nerve to the iris. There was no trace of the humours. The sclerotica was unchanged: the morbid growth adhered to it closely behind, and the optic nerve proceeded through the centre of the mass. The latter was a dense compact structure of scirrhous firmness, resisting the edge of the knife; its exterior consisted of a light grey texture, very much like that of a scirrhous breast, while in the interior this was intermixed with a light yellow, yet firm substance, resembling what is seen in scrofulous diseases. I use the term "scirrhous" merely to describe the sensible characters of the structure, and not to convey an opinion that it was of carcinomatous nature. I did not entertain the slightest apprehension that disease would return; yet, on reviewing the history of the case, and comparing with its course the bulk and texture of the morbid growth, I could not doubt that the latter would have continued to enlarge, and the sufferings of the patient to increase, had the disease been left to itself.

"I have repeatedly seen," says Mr. MACKENZIE, "the cellular substance near the front of the orbit become hard and tuberculated, in consequence of slow inflammation, occasioned by an injury. In one instance a piece of limestone struck the outer edge of the orbit, producing a lacerated wound of no great extent, and which readily healed. Some time after, a small hard swelling formed at the site of the injury, was extirpated, and was found to contain a minute fragment of limestone. After some months, another small tumour made its appearance in the same spot, and in connexion with it another, attached so firmly to the edge of the orbit, that it was taken for an exostosis. In a few weeks, a third circumscribed swelling was discovered running along the lower edge of the orbit, more moveable than that last mentioned, but firm to the touch as a piece of cartilage. The patient was under the care of Mr. SAMUEL CLARKE of this town, whom I assisted at the removal of the tumours. The two which felt so like exostoses, lay partly within the orbit, and adhered firmly to its periosteum. On making a section of them, they presented the white striated texture of scirrhus. The extirpation was accomplished after a semilunar incision, running parallel to the outer and lower edge of the orbit, and every particle of indurated substance was carefully removed. Nearly a year has elapsed since the operation, and there has been no return of the disease."[*]

Steatomatous tumours.—Morbid growths removed from the orbit have sometimes been mentioned under the name of steatoma, but without an exact description of their composition and nature. Hence, as that term is often used loosely, we cannot determine whether these steatomatous orbital tumours were properly so called, being encysted and containing fat, or whether they were of the sarcomatous kind.

Dr. HOPE removed from the orbit, in a girl of eighteen, a tumour which had been growing seven years. At first it did not appear outwardly, but it increased gradually, and formed a firm swelling, reaching from the internal to the external angle, protruding the lower lid, and thrusting the globe upwards and outwards, so that the pupil was three quarters of an inch further from the nose, than that of the other eye. Vision was imperfect, but not lost. It was removed by an incision carried through the integuments of the lower eye-lid. It proved to be a spherical swelling, smooth and even, about the size of a small pigeon's egg, extending nearly to the back of the orbit, and of "carnous substance." The eye gradually receded to its natural position, and vision was completely restored.[†]

Dr. MONTEATH has shortly mentioned two cases, in one of which there was relapse of disease. "The first was in a young girl. The tumour was in the upper and outer side of the orbit. In order to get at it, I was obliged to cut across, perpendicularly, the whole breadth of the upper eye-lid, and dissect back the two flaps. The tumour was nearly the size of a plum, and reached as far back as the eye-ball. It was slightly encysted, perfectly organized, and of anomalous texture. The healing of the wound was rapid, and, contrary to my expectation, the eye-lid united perfectly, and regained very nearly its natural power and extent of motion. The eye-ball did so also, and the vision was perfect. This girl went to England some months after, and I was concerned to learn from the surgeon, under whose care she was, that the tumour had begun to grow again.

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[*] *Practical treatise*, p. 265.

[†] *Philosophical transactions*, No. 474, p. 194. *Phil. trans. abridged*, vol. 10, p. 951, fig. 61.

"The second case was in a young adult woman. The disease was of two years' standing before I was consulted, and had produced hideous exophthalmos. It was found impracticable to extirpate the tumour without also removing the eye-ball, which was accordingly done. The tumour exceeded the size of the eye-ball, lay directly behind it, and so completely encircled the optic nerve, that the latter was diminished one-half in thickness by the pressure of the tumour. The vision had been rapidly declining previously to the operation. This tumour was exceedingly hard, of anomalous texture, and surrounded by a layer of condensed cellular substance. The anterior aspect of the tumour touched and pressed upon the posterior aspect of the eye-ball, but had no connexion with it, except through the medium of the optic nerve and of the cellular substance. This young woman has continued well for twenty months, and is in perfect health." [*]

Langenbeck removed from the orbit of a woman, forty years of age, a "steatomatous tumour," which was connected to the globe and its muscles. The swelling, situated behind the lower lid, reached from the inner to the outer angle, and extended to the upper margin of the orbit: it was firm to the feel, and somewhat moveable. The eye was pushed upwards and inwards, but natural in appearance; the iris exhibited its usual motions, but vision was lost. The lids were separated at the external commissure, and the tumour was then dissected away by cutting through the conjunctiva. The globe gradually returned to its proper position, the deformity caused by its displacement was completely removed, and the patient was able to see the smallest objects before she left the hospital. [†]

Another case of steatomatous swelling, related by Langenbeck, exemplifies the serious results which occasionally follow the operation. The patient was a healthy robust man, forty years of age. The operation presented no difficulties, and after its performance, the globe, which had been considerably protruded, returned to its natural situation. In the course of the day restlessness, loss of speech, involuntary discharge of feces and urine took place, and the patient died comatous on the following morning, in spite of large bleeding, and cold applications to the head. It was afterwards discovered that he had been intoxicated with spirits the evening before the operation. No morbid appearances were discovered, except in the anterior lobe of the brain, on the side of the operation, and in the corresponding superior surface of the orbit. They showed all the traces of inflammation, such as change of colour and purulent exsudation. There was no communication between the tumour and the cavity of the cranium.[*]

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[*] *Translation of* Weller's *Manual of the diseases of the eye*, vol. i. p. 195, note.

[†] *Ein Beytrag zu den abnormen Metamorphosen in der Orbita, mit der Erscheinung von Exophthalmos*; in the *Neue Bibliothek für die Chirurgie und Ophthalmologie*, vol. ii. p. 238—240. Tab. i. fig. 1.

Langenbeck removed from a lady of thirty, a steatoma, which had caused not only considerable protrusion of the eye, but also a conspicuous enlargement of the external side of the orbit. Violent pain of the head had attended the origin and development of the deformity. The patient recovered favourably from the operation; the head-ache ceased; the eye partly returned to its situation in the orbit, but the unnatural prominence of the latter, in its temporal region, was unaltered. After some months, periodical pains in the head returned, and became more and more violent; coma and death ensued. The body was not examined.[†]

Encysted tumours.—Encysted tumours are much more frequent in the orbit, than those of the sarcomatous kind. In the greater number of cases, the cyst is thin, and its contents are an aqueous or glairy fluid:[‡] under such circumstances, the nature of the disease may be indicated by the characters of softness and fluctuation in the swelling. If the cyst should be thick, and the contents of greater consistence, the case cannot be distinguished from that of a fleshy tumour. Encysted growths of the latter kind must be extirpated. The serous cysts, which contain watery fluid or hydatids, may be obliterated by the inflammation consequent on puncture and exposure of the cavity. A knowledge of this circumstance, which will be fully proved by cases subsequently related, is of great importance where cysts, in consequence of their magnitude, and close connexion to the globe and other surrounding parts, cannot be extirpated without sacrificing the contents of the orbit generally. **Beer** removed the globe with the cyst in such a case.[§] That this severe proceeding is not necessary, will appear clearly from facts to be adduced presently.

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[*] *Lib. cit.* p. 241—244.

[†] *Lib. cit.* p. 244. Tab. i. fig. 3.

[‡] "The encysted tumours, which I have found between the globe and the orbit, have always been of the aqueous kind, (*hygroma*,) and have appeared, either as a swelling of the lacrymal sac (*dacryops*,) or as an hydatid of the lacrymal gland." **Beer**, *Lehre*, vol. ii. p. 589. He mentions, however, in a note, that he had met, in one instance, with a large watery cyst external to the lacrymal gland.

[§] *Lehre*, vol. ii. p. 589; note.

LANGENBECK had under his care a young man with a swelling under the upper and outer part of the orbit, which pushed the eye downwards and inwards. It projected externally, and fluctuation could be felt in it. When an incision had been made through the integuments, and the tumour was denuded, it proved to be a shining white transparent bladder, as large as a pigeon's egg, which was removed entire. It contained fluid.*

An interesting case of orbital encysted tumour is related in the fourth volume of the *Medico-Chirurgical Transactions*,† by Mr. BARNES, of Exeter. The patient was a healthy youth of seventeen. "The tumour was situated beneath the eye, occupying a very considerable portion of the orbit; the eye in consequence being pushed into the upper part of that cavity, so as to be almost wholly hidden behind the upper lid. On turning it backwards, it appeared to extend to a very considerable depth; and it projected so much in front, as to constitute a very striking deformity."—"The ciliary edge of the lower tarsus, with a few scattered hairs in it, crossed the front of the tumour, rather above its middle; the conjunctiva, drawn forwards from the eye-ball, greatly stretched, but not apparently much altered in structure, investing it above; and a thin skin of a deep red, loaded with purple vessels, covering it below; but neither of them closely adherent to it. The portion of the tumour in front was soft, and could be moulded into different shapes by the fingers; the posterior division felt more elastic." He could not elevate the upper lid, but when it was lifted, so as to expose the pupil partially, objects could be imperfectly distinguished. There was scarcely any power of moving the eye to different points. "The swelling was first observed in early infancy, and was at that time not much larger than a pea. It increased but slowly, until about four or five years since, when it began evidently to enlarge, and for some time it grew rapidly. Latterly it had not advanced much." The sac adhered firmly to the outer angle and part of the lower edge of the orbit: elsewhere its connexions were loose. It was found to extend almost to the bottom of the orbit, and to occupy more of the cavity than the eye itself did. The contents were evacuated by a puncture, in order to get room. On the inner side, and about an inch from the edge of the orbit, the sac seemed to embrace a sharp bony process arising from the surface of the cavity, but slightly movable, as if attached to the periosteum only. This body was removed without difficulty, together with the connected portion of the cyst; it turned out to be a tooth. The tumour was made up of two cysts, separated by a deep groove all round, but indissolubly united in the centre. The interior of the front cyst was rough, with a little chalky matter adhering to it. The contents were a compact lardaceous substance. The inner surface of the posterior sac was smooth, excepting a part near the tooth, where it had much the appearance of coarse skin with many pores in it. The contents were partly a whey coloured fluid, and partly a yellow curdy substance. The eye gradually sunk to its natural situation, so that, within a fortnight, it was nearly on a level with the other. The vision of this eye was perfect, but its motions were very limited.

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* *Lib. cit.* p. 241; Tab. i. fig. 2.

† *Case of a double encysted tumour, the posterior cyst of which, situated deeply between the eye-ball and the floor of the orbit, was attached to, and partly contained a tooth.* p. 316—321. Plate i. fig. 1 and 2.

Dr. Bushe published in the Lancet, "*a case where the right eye, and a large encysted tumour, were successfully removed.*" In November, 1826, J. Albutt was, without any known cause, affected with protrusion of the right eye, which gradually increased. In April, 1827, there was considerable exophthalmia, with total loss of vision, and a great tendency to torpor. A tumour could be felt above the globe, which was pushed downwards and forwards. Some of those who saw the case supposed, from the situation of the swelling, its rapid growth, and the accompanying cerebral symptoms, that it was a fungus from the anterior lobe of the brain. As there was no affection of the brain in the commencement, Dr. Bushe considered that the alarming symptoms arose from the pressure of the tumour on the brain, and proposed extirpation, to which the parents consented when the progress of the disease had caused more serious symptoms, viz. coma, partial paralysis of the left side of the face and upper extremity, with a dilated and immovable condition of the pupil. The commissure of the lids was divided, and the tumour partially separated from the orbit: it was found so closely connected to the globe, that it could not be removed without the latter. "I, therefore," says Dr. Bushe, "drew the contents of the orbit downwards and forwards, by inserting a curved needle, armed with a strong ligature, through the edge of the tumour and globe of the eye; I now cautiously proceeded to detach the tumour at its posterior part; but, before I had proceeded far, I was not a little surprised to find, that what I had anticipated was correct, viz. that the tumour pressed on the anterior lobe of the brain, the posterior and superior part of the roof of the orbit being absorbed; however, I cautiously pursued the separation of parts to the foramen opticum, and finally divided the optic nerve and recti muscles with a curved scissors. Slight hemorrhage followed the operation, but was easily restrained by a portion of sponge. In ten days the wound had nearly healed, and the little patient was walking about without any inconvenience"[*] No description is given of the extirpated parts; an omission which detracts greatly from the value and interest of the case.

Immense cyst in the orbit, containing serous fluid, treated by incision, and obliterated by subsequent inflammation and granulation.—The following case, which is related by DELPECH, in the second volume of his *Chirurgie Clinique,*[†] is that of a girl, twenty-four years old, in whom the disease began at the age of three, after a fall, in which the back of the head struck the ground. The accident was followed by pains in the head, which soon went away; but the right eye began to project, and became inflamed; sight was lost, the globe was thrust out of the orbit and between the lids, so as to form the apex of a large tumour. When this patient was received into the hospital Saint Eloi, at Montpellier, a conical tumour, more than six inches in height, seemed to issue from the right orbit. Its circular basis measured nearly twelve inches in circumference, and contained a bony ridge, which was easily distinguished, as the anterior aperture of the orbit enormously enlarged. Corresponding alterations had necessarily occurred in the form and position of the superciliary ridge, the temple, cheek, and upper jaw, as well as in the angle of the mouth, which was depressed, and in the nose, which was strongly turned towards the left. The eye-brow and the eye-lids, singularly stretched, were seen at the circumference of the swelling. A line, scarcely perceptible above and below, marked the ciliary margin of the latter, in which there were a few cilia. The tumour, with the exception of its central and prominent part, was covered by the conjunctiva, converted, by exposure to the air for twenty-one years, into an artificial cutaneous texture, but still delicate and susceptible of occasional inflammation. The situation of the cornea was marked in the apex of the cone, by a small surface of a light blue tint. The tumour generally was elastic and fluctuating, and the fluctuation was more manifest at the apex, and in the situation of the lower lid. Professor DELPECH concluded, from the good constitution and perfect health of the patient, together with the history of the case, and the state of parts just detailed, that the disease was a cyst developed in the bottom of the orbit; and that an attempt to procure its obliteration might be made with a fair prospect of success. He punctured the swelling a little behind the situation of the ciliary margin of the lower lid, when a limpid or rather slightly yellow serosity escaped. He then enlarged the opening horizontally, to the extent of two inches, and introduced his finger into the cavity, which he found to be lined throughout by a thick membrane consolidated with the parts on which it was expanded. Towards the centre, the parietes of the swelling were scarcely thicker than elsewhere, so that the globe must have been shrunk and nearly effaced. The swelling subsided considerably after its evacuation. The interior of the cyst was filled with bundles of charpie tied with waxed thread, which were renewed every six days. The discharge, at first serous, became opaque, and then purulent. The febrile disturbance concomitant on the suppuration was attended with pain in the stomach and bowels, thirst, and occasional vomiting; and these symptoms lasted, in spite of all remedies, until the introduction of foreign substances into the cyst was prevented by its obliteration. For the first month, the cavity underwent no diminution. On the sixtieth day the swelling had shrunk to one-half its former size, and the cavity was reduced to a small sinus. In three months the cicatrization was complete: the swelled parts then shrunk rapidly, and were retracted towards the orbit; all uneasiness ceased, appetite and strength returned. At the end of twelve years, the parts had completely retired within the orbit, of which the dimensions were greatly reduced; and the patient wore a simple black patch.

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[*] *Lancet*; 1827-8. vol. ii. p. 430.

[†] P. 92—98. Plate xxxv.

Case of hydatid in the orbit, with protrusion of the globe, and blindness; removal of the hydatid by an operation; recovery of sight.[*]—A peasant, twenty-five years of age, experienced, in the beginning of 1820, sharp pain in the right eye, which he compared to that caused by a foreign substance under the eye-lid. It disappeared soon. In January, 1821, he had a severe pleurisy, with inflammation of the same eye, which went off, but left the sight weakened. It is probable that the protrusion had begun then, though the patient had not observed it. In a short time inflammation of the eye returned, with swelling of the lids and pain. Ultimately sight was lost. The patient came to the hospital Saint Eloi in November, 1822. The eye was then considerably displaced, distending the lids, which covered it imperfectly. The iris was motionless, the pupil fixed, and vision was gone. There was a little redness of the conjunctiva. The integuments of the palpebræ were raised by a tumour, which was particularly distinguishable towards the external angle, and distended the upper more than the lower lid. There was a deep-seated and rather equivocal fluctuation in the swelling, from which, together with the other circumstances of the case, Monsieur DELPECH thought it probable that the swelling was caused by a serous cyst. He made a curved incision along the outer half of the upper lid, the external angle and one-third of the lower lid. After the orbicularis had been divided, the lacrymal gland came in view, displaced from its fossa, and enlarged. The projecting part was removed to give room. A serous cyst was soon discovered, but it could not be completely denuded until the levator palpebræ superioris had been cut through in half its width. The cyst was now punctured, and about three ounces of nearly colourless serous fluid escaped. Immediately a white membranous mass presented at the opening; when seized, it readily came out, and proved to be a large hydatid *(acephalocyste.)* The cyst was found, on examination, to be merely a condensation of the cellular membrane. The eye now returned to its situation. The cavity was gently filled with pieces of agaric, tied with waxed thread. The pain and fever in the evening required bleeding from the arm. On the fourth day some of the agaric had been pushed out of the wound; the dressings were renewed, and were repeated every day till the twelfth, when the wound would only admit a small bit of lint. On elevating the upper lid, which had been swelled after the operation, and was now reduced in size, the patient discovered that he had regained his sight; the iris now moved again, and the pupil exhibited the usual variations in size. On the fifteenth day the sinus was obliterated, and the patient left the hospital, completely cured, in a month after the operation. The eye had regained its natural situation, and its vision was nearly equal to that of the other.

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[*] DELPECH in *lib. cit.* p. 99—104.

I consider the practice followed by Professor **Delpech** in these cases, of filling the cavity, after the operation, with charpie or agaric, highly objectionable, as likely to excite and keep up serious inflammation. That the objects we have in view can be accomplished without it, is obvious from a case which I have related elsewhere,* as well as from the following example.

Case of cyst in the orbit, containing hydatids, and causing protrusion of the globe; puncture of the cyst, and subsequent obliteration.—"**Charles Rowell**, forty-two years of age, was admitted, under my care, into the London Ophthalmic Infirmary on the 3rd of January, 1820, with protrusion of the globe from the orbit by a deep-seated tumour, which had been growing for seven years. He had applied at the infirmary in an earlier period of the affection, when the unnatural prominence of the eye-ball was distinctly marked, but vision had not become impaired. I could then feel obscurely, under the superciliary arch, a small firm protuberance, which seemed to be part of a deeply-seated swelling, and I considered that extirpation of this growth by an operation afforded the only chance of relief. The patient was averse to this measure, which was not strongly recommended, and he discontinued his attendance. The complaint had slowly increased, its progress having been attended with great pain, which for some months had been so severe, both day and night, as to cause great emaciation and general weakness. When this patient was admitted into the infirmary, the tumour had advanced so far between the upper and inner portion of the eye-ball and the eye-lid as to have thrust the globe completely out of the orbit. The upper lid, greatly stretched and inflamed, covered the eye and the tumour; the lower was completely everted, and its membranous lining appeared as a thick fleshy mass. The conjunctival covering of the globe was thickened by chronic inflammation, the consequence of exposure. The structure of the eye was uninjured: the pupil round, and about in the middle state; the iris motionless. Vision was destroyed. The tumour was firm, and apparently fixed to the orbit: it afforded, on pressure, an obscure sense of fluctuation. To relieve the distension and pain, and acquire some further insight into the nature of the disease, a puncture was made into the most prominent part of the swelling, and about a dessert spoonful of clear watery fluid escaped. Considerable diminution of suffering ensued. When I examined the part two days afterwards, I found a soft opake white substance in the puncture, and proceeded to remove it with a pair of forceps; it proved to be an hydatid, and a few others escaped when pressure was made on the swelling. Some more came away on the following day, and I afterwards cleared out the whole collection, amounting to half a tea-cup full, by enlarging the puncture and injecting water forcibly into the sac. The hydatids varied in size, from that of a filberd to that of a small pea; some were entire, others collapsed. Inflammation and suppuration of the cyst followed without much pain; the discharge then gradually diminished, and the opening closed in about a month. The eye returned to its natural situation, and all uneasiness ceased. In March, the only traces of the complaint were a loose and wrinkled state of the integuments of the upper lid, and the eversion of the lower, which was gradually diminishing by the application of lunar caustic to the thickened conjunctiva. A little motion of the iris and slight perception of light had returned."*

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* *Medico-chirurgical transactions*, vol. xvii. p. 44—46.

ANEURISMAL AFFECTIONS IN THE ORBIT.

In the two following cases the disease called *aneurism* by *anastomosis*, of which the nature is hitherto imperfectly understood, existed in the orbit, and was remedied by a surgical operation.

CASE I.—*Aneurism by anastomosis in the orbit, cured by the ligature of the common carotid artery.*†—" FRANCES STOFFELL, (aged thirty-four, a healthy, active woman, of fair complexion, middle stature, and the mother of five children,) on the evening of the 28th of December, 1804, being some months advanced in pregnancy, felt a sudden snap on the left side of the forehead, which was attended with pain, and followed by copious effusion of a limpid fluid into the cellular substance of the eye-lids on the same side. For some days preceding, she had complained of severe pain in the head, which was now increased to so great a degree, that for the space of a week she was unable to raise it from the pillow. The œdematous swelling surrounding the orbit was reduced by punctures; an issue was set in the temple for a smart attack of ophthalmia, which supervened, and leeches and cold washes were applied. She now first perceived a protrusion of the globe of the eye, which affected the sight, and a circumscribed tumour, elastic to the touch, about as large as a hazel nut, appeared upon the infra-orbitary ridge. Another softer and more diffused swelling arose, at the same time, above the tendon of the orbicularis palpebrarum. The lower tumour communicated, both to the sight and touch, the pulse of the larger arteries; the upper gave the sensation of a strong vibratory thrill. The swellings grew slowly, and the skin between the eyes and that of the lower eye-lid became puffed and thickened. The globe of the eye was gradually forced upwards and outwards, and its motions were considerably impeded. She had a constant noise in her head, which, to her sensation, exactly resembled the blowing of a pair of bellows. The pulsatory motion of the tumours was much increased by agitation of mind, or strong exercise of body. But the most distressing of her symptoms was a cold obtuse pain in the crown of the head, occasionally shooting across the forehead and temples. She was compelled to rest the left side of the head on her hand when in the recumbent posture, and found the beating and noise to increase sensibly when her head was low and unsupported." Mr. TRAVERS found that the thrilling tumour at the inner canthus had a loose woolly feel, was very compressible, and when firmly compressed, offered slight pulsation. The veins of the superior lid were distended and varicous, and those on the sides of the nose were turgid. "The lower tumour could be emptied or pressed back into the orbit, but the pulsation then became violent; and from the increased pressure of the globe upon the roof and side of the orbit, the pain was insupportable. Careful compression of the temporal, angular, and maxillary arteries produced no effect on the aneurism. Upon applying my thumb to the trunk of the common carotid, I found the pulsation cease altogether, and the whizz of the little swelling was rendered so exceeding faint, that it was difficult to determine whether it continued or not." The common carotid artery was tied on the 23rd of May, 1809; the pain in the head was immediately numbed, and the noise in the head entirely ceased; the small tumour over the angle of the eye still thrilled, but very obscurely. The recovery from the operation was favourable, and at the end of four months the tumours weresmaller, and their motion materially diminished; the eye was less projecting, and the dull pain but rarely felt. On the 28th of October she experienced miscarriage with profuse hemorrhage. This was followed by diminution of the swellings, and entire cessation of pulsation: the projection of the eye was also lessened. In May, 1811, no vestige of the disease remained, but a knob of the size of a pea, over the inner angle of the eye. I saw this patient two or three years after the date last mentioned; she continued perfectly well.

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* *Lib. cit.* p. 48—50.

† *Medico-chirurgical transactions*, vol. ii. p. 1—16. Plate I.

CASE II.—*Aneurism by anastomosis in the left orbit, cured by tying the common carotid artery.**—DINAH FIELD, aged forty-four, delicate and sickly, being then pregnant with her sixth child, was seized in the middle of the night with an intense pain in the left eye-ball, accompanied by a whizzing noise in the head, which grievously distressed her. The attack was instantaneous: hearing a noise as of the cracking of a whip, and feeling an extraordinary pain in the left eye, she awoke in great pain, and leaped out of bed. Inflammation of the eye and swelling of the lids came on, with almost intolerable anguish in the left eye-brow and at the bottom of the orbit, and acute pain over the whole side of the head. The extreme violence of the pain abated the following night, but the swelling of the lids was rather increased. No further change took place in the next seven weeks, at the end of which she was delivered. Subsequently she lost the power of elevating the upper eye-lid, and became totally blind on the diseased side. At the end of eight or nine months, there was constant and acute pain, chiefly referred to the bottom of the orbit: but the greatest suffering arose from an unceasing noise in the head, compared to the rippling of water, and becoming insupportable whenever the head fell below a certain level. The left eye-ball was protruded, so as to distend the upper lid, and immovable. The cornea was transparent, the iris motionless, the pupil fixed, and a fawn-coloured appearance was seen behind the lens. The palpebræ were swollen, and the lower everted, so as to form a bright red convex swelling. The tumid parts were soft and elastic to the touch, but contained portions of a firmer feel, which communicated a vibratory thrill on pressure. The integuments of the forehead, above the inner end of the eyebrow, and those on the inside of the nose, were elevated into a soft undefined tumour giving a faint tremulous motion to a finger placed upon it. The veins of the face generally were turgid. Pressure on the common carotid artery nearly stopped the pulsation about the eye. The common carotid artery was tied by Mr. DALRYMPLE, on the 7th of April, 1813. "The effects of the operation were immediate and decisive. As soon as the ligatures were tied, the pulsatory motions of the tumours on the forehead and cheek entirely ceased; but a slight thrilling was still perceptible in the tumid upper eye-lid. The red swelling of the lower eye-lid became paler, and its surface shrivelled. A few minutes after the patient was placed in bed, she was quite free from pain, and the noise by which she had been so long tormented having now also ceased, she declared that her head no longer felt like her old head." At the end of two years from the operation, Mr. **Dalrymple** says, that the cure appears complete, with the exception of the sight, which is irrecoverably lost. No pulsation can be felt in any of the branches of the temporal and facial arteries on the side of the operation.

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* The case is related by Mr. DALRYMPLE of Norwich, in the *Medico-chirurgical transactions*, vol. vi. p. 111—123.

Mr. **Guthrie** has recorded an example of true aneurism of the ophthalmic artery on both sides, which terminated fatally. The globe was protruded, but vision was scarcely affected. Hissing noise in the head was distinctly heard, and attributed to aneurism. On the death of the patient, an aneurism of the ophthalmic artery was discovered on each side, of about the size of a large nut. The ophthalmic vein was greatly enlarged and obstructed near where it passes through the foramen lacerum orbitale superius, in consequence of a great increase of size the four recti muscles had attained, accompanied by an almost cartilaginous hardness, which had been as much concerned in the protrusion of the eye as the enlargement of the vessels.*

Fractures of the orbit, whether simple or compound, single, comminuted, or attended with displacement; gun-shot injuries of the same part, and diseases of the bone or of its membranous covering, such as enlargement (*hyperostosis*,) exostosis, caries, periostitis whether simple, syphilitic, or scrofulous, must be treated according to the general principles applicable to the management of such injuries and diseases, which, however, are more serious here than in many other situations, from the near neighbourhood of the eye-ball and brain. Diseases originating in various neighbouring parts, such as the brain, the antrum, the nose and its sinuses, may make their way into the orbit, and cause displacement of the globe. This circumstance must be borne in mind when we are endeavouring, in a case of obscurity, to ascertain the cause on which protrusion of the eye-ball depends.

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* *Lectures on the operative surgery of the eye*, 2nd Edition, p. 168.

CHAPTER XXIX.

DISEASES OF THE LACRYMAL ORGANS.[*]

SECTION I.—DISEASES OF THE LACRYMAL GLAND.

The lacrymal, like the other conglomerate glands, is very rarely diseased. Schmidt states that acute inflammation of this gland, with inflammatory swelling of the upper eye-lid, is not uncommon; and that he had often treated such cases.[†] Beer represents that the disease is very uncommon; that he had seen it only a few times in the course of twenty-seven years; and that, when it occurs, it is very seldom an idiopathic affection.[‡] He describes, however, acute inflammation of the gland, as sometimes proceeding to suppuration, and occasionally leaving behind, under the superciliary ridge, a capillary fistulous opening, from which clear lacrymal fluid is discharged; he calls this a true *fistula lacrymalis*.[||] According to the representation of Mr. Todd, acute and chronic inflammation, and suppuration of the lacrymal gland are common occurrences. I do not remember having seen either of these affections; if, therefore, the preceding representations are correct, I must either have overlooked diseases of this organ, which have been noticed by others, or have mistaken them for other affections. In twelve of the annual reports of diseases, treated at the London Ophthalmic Infirmary, which I am able to refer to as I am writing, the lacrymal gland is not even mentioned in the list of diseases.

Enlargement and induration of the lacrymal gland.—A change of structure in this part, accompanied with increase of size and hardness, has been denominated scirrhus by some writers, who have represented the affection as cancerous. I doubt the correctness of the latter opinion, never having seen any evidences of malignity in such cases. The gland is converted into a knotted swelling, of firm consistence, with an obscurely lobulated appearance on a section. It has not the incompressible hardness and compact cartilaginous texture of scirrhus, although nearly resembling it in colour and general appearance. It does not become adherent, like scirrhus, to the surrounding parts; it does not contaminate the absorbent glands; nor does it return after extirpation. The texture of the diseased mass is very similar, in consistence and colour, to that of the knotty swellings, which are formed in the neighbourhood of the parotid gland.[*]

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[*] J. A. Schmidt; *Ueber die Krankheiten des Thränenorgans.* Wien. 1803.

W. Mackenzie; *Essay on the diseases of the excreting parts of the lacrymal organs.* London, 1819.

C. H. Todd, *on diseases of the lacrymal gland*; in Dublin Hospital Reports, vol. iii. p. 407.

[†] *Lib. cit.* p. 134.

[‡] *Lehre,* vol. i. p. 349.

[||] *Lib. cit.* vol. i. p. 356; and vol. ii. p. 184. In the latter place, Beer says that this minute, and sometimes scarcely visible opening, from which a clear lacrymal fluid escapes through the day, is one of the rarest consequences of ophthalmic inflammation. He recommends rubbing the fistulous track with lunar caustic, brought to a fine point; and he once introduced into the opening a knitting needle made red hot, with success.

Beer represents that a fully developed scirrhus, affecting the lacrymal gland only, is one of the very rarest effects consequent on inflammation of the eye; and that, in most cases, where this part is the seat of true scirrhus, other surrounding textures, and the globe itself, are usually involved in the affection. In describing the symptoms, where the gland alone is affected, he mentions, in addition to the displacement of the globe by the swelling, and to the absence of pain, dryness of the eye, opacity of the cornea, and a shrivelled state of the conjunctiva, making the eye look like that of a half decayed corpse. He says that he never saw cancerous ulceration confined to the lacrymal gland. He advises that no attempt at extirpation should be made, because the extent of mischief cannot be ascertained previously to an operation, and because the periosteum or the bone may be affected. He adds, that he has seen many cases, in which the complaint, having been left to itself, under favourable circumstances, has remained for several years without disturbing the health or comfort of the patient.[†] The foregoing statements respecting the symptoms and treatment of the affection, are quite at variance with my experience, as will appear from the cases subsequently related.

Using the term scirrhus, in its strict sense, and not including under it enlargement and induration consequent on inflammation, Schmidt says that he had never seen it as an affection confined to the lacrymal gland.[‡]

Mr. Travers represents that cancer is peculiar, in the organ of vision, to the lacrymal gland, conjunctiva, and eyelids.[*] He says, "I removed the lacrymal gland, greatly enlarged and in a state of true scirrhus, from the orbit of a middle-aged man, a merchant's clerk in this city. The vision of that eye had suffered considerably during the growth of the tumour; in other respects, he continued quite well when I last saw him, after an interval of some years."[†]

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[*] *Medico-chirurgical transactions*, vol. xvii. p. 19.

[†] *Lehre*, vol. ii. p. 243—246.

[‡] *Lib. cit.* p. 130.

Mr. Todd mentions the affection of the lacrymal gland as scirrhous or carcinomatous, and relates two instances of successful extirpation.

Case I. A woman, seventy years of age, who had received a blow on the eye seven years before, and had been subject since that time to frequent discharges of tears, perceived a tumour under the eye-brow a year before she came under the care of Mr. Todd. Pain and head-ach soon came on, and became very severe. The tumour, which was knotty, projected more than half an inch beyond the superciliary ridge: it was hard, and slightly movable in the transverse direction. The eye-ball was pushed downwards, so that the cornea was nearly on a level with the ala nasi; and the lower lid was everted. The cornea was slightly obscured; and vision was lost. Severe lancinating pains extended from the tumour to the globe, accompanied with a sense of heat, and frequent discharge of hot scalding tears. The diseased gland was removed by Mr. Todd, on the 30th of August, 1831, in the Richmond Hospital. It was so firmly wedged into the orbit, that the handle of the scalpel was with difficulty introduced between it and the superciliary ridge, to detach the mass from the roof of the orbit. Its surface towards the eye was irregularly lobulated, and the lobes had insinuated themselves amongst the muscles and other contents of the orbit, so as to render their disentanglement embarrassing and hazardous. "The diseased gland was found, on examination, much larger than a walnut; it presented, on the surface, which had been turned towards the eye, three considerable eminences or lobes, with deep fissures between them; it was almost as firm as, but more elastic than, cartilage. A section of the gland exposed several small cartilaginous cysts, which contained a glairy fluid, and the interspaces consisted of a firm fatty substance, traversed by a few membranous bands." The patient recovered from the operation, and was discharged from the hospital on the 10th of September. The eye appeared sound, and had nearly regained its natural position; vision was extinct. The patient continued perfectly well in the following December.*

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[*] *Synopsis*, p. 216.

[†] *Lib. cit.* p. 228.

CASE II. A strong and athletic man, twenty-two years of age, was received into the Charitable Infirmary, Dublin, by Mr. O'BEIRNE, on the 21st of December, 1830. The globe of the right eye projected more by its semi-diameter than the opposite, yet was covered by the upper lid hanging loosely over it. The pupil was dilated and fixed, the cornea turned towards the nose. A tumour, with indistinct outline, occupied the upper and outer part of the orbit. There was considerable pain in the side of the head and face, with watering and uneasiness of the eye from external excitement. He saw double, and vision was in other respects so imperfect that he could not work as a labourer. Two years previously he had first perceived, occasionally, sparks and mists before the eyes, with pains in the side of the head and face. In about a year, slight prominence and inversion of the globe were observed. The tumour, of which the real nature had not been suspected, was removed on the 23d, and turned out to be an enlarged and indurated lacrymal gland. "The surface was granular, and of a pink colour. When cut into, it presented a hard membranous, or rather cartilaginous centre, from which septa passed to the circumference. No sanies could be perceived. The gland was enlarged to at least six times its natural size." The wound was healed on the 14th day after the operation, when the eye had returned to its natural position, the iris had regained its power of motion, vision was perfect, and all uneasiness was gone."†

In the two following instances, of successful extirpation, the lacrymal gland, in respect of its hardness, might have been called scirrhous; I saw no reason for suspecting the disease to be malignant. In both these cases, as well as in those quoted from other authors, where extirpation was practised, the gland was greatly enlarged. The female breast, when affected with scirrhus, is not usually augmented in bulk; sometimes, on the contrary, it is diminished.

CASE I. *Enlarged and indurated lacrymal gland successfully extirpated in a young man.*—JOHN CLIFTON, twenty-four years of age, from Market Street, Hertfordshire, came under my care at the London Ophthalmic Infirmary, on the 14th of March, 1826. Seven years ago he was struck violently on the left upper lid, by an apple thrown at him; swelling followed, and gradually subsided. Two months afterwards the lid swelled again, with considerable pain, which, having lasted a month, went off entirely. With the swelling the eye began to water, and there was a constant copious lacrymal discharge, rendered still more abundant by exposure to the air. The swelling of the lid and the lacrymation continued, and the globe was gradually protruded from the orbit, with loss of all useful vision. A fortnight before admission, inflammation of the eye took place, with considerable pain. There is now a general fulness of the upper lid, which is more particularly swelled and increased in breadth near the external angle. The eye-ball and lower lid, pushed downward and inwards, reach about half way between the orbit and nose; but, though the former is out of its socket, the lids are so extended, as to cover it completely. The external tunics are considerably inflamed; there is a broad red zone in the sclerotica round the cornea, with general dullness, and small ulcer of the latter. A hard unyielding tumour, with tuberculated surface, projects a little beyond the margin of the orbit, at its upper and outer part. This seems to admit of being moved a little, from side to side, upon the bone; but the point is rather doubtful. Blood was abstracted by cupping and leeches, and opening medicine was administered. The tumour was removed on the 25th of March, the external incisions being ample, as it obviously filled a large portion of the cavity. The longest, of about three inches, extended from the root of the nose, along the fold of the upper lid, to the temple; a second, of about two inches, passed perpendicularly over the forehead and upper and outer part of the orbit, to meet the other at right angles: it was necessary to make a third cut from the first incision towards the anterior part of the zygoma. When the flaps made by this crucial incision were turned aside, the seat of the tumour was completely exposed. No other difficulty was experienced except that inseparable from the size and hardness of the swelling, its deep extent backwards, and close contact with the orbit and its contents: the surrounding connexions were, however, merely cellular. The tumour was found to be the lacrymal gland, increased to the size of a large walnut, and of compact homogeneous texture. It had a light yellow colour, with an appearance of radiated fibres at one point; it approached in firmness to cartilage, and altogether bore a near resemblance to the firmest part of a scirrhous mammary gland. A large quantity of blood was lost during the operation: as it filled the deep cavity left by removing the tumour, so that its source could not be readily discovered, the patient was left quiet in bed, with the wound open, in the hope that the bleeding would cease: it went on freely for more than half an hour, rendering the patient very faint; an artery was then tied. The edges of the wound were now approximated by five small silk ligatures, and three narrow slips of adhesive plaster, and the parts were covered with a wet rag dipped out of cold water, and occasionally renewed. 26. The wounds had united by adhesion; the sutures and adhesive plasters were removed, the lids thoroughly cleansed, and the parts then covered with a wetted rag. The eye had receded to its natural position, and the inflammation of the sclerotica had ceased. The patient, having been quite well for some days, left the Infirmary on the 9th of April. The wound united completely by adhesion; no suppuration occurred. The globe had regained its natural position and moved freely, its surface, and that of the lids, being as moist as usual. The external inflammation had ceased; the cornea had nearly recovered its transparency, and vision was much improved. He was desired to return to the Infirmary if disease should recur in the eye; but we never saw him again.

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* *Lib. cit.* p. 419—426.

† *Lib. cit.* p. 426—429.

CASE II. *Enlarged and hardened lacrymal gland in a young subject, successfully extirpated.*—A gentleman, twenty-seven years of age, who had been long subject to asthma, came under my care in the summer of 1828, for a tumour in the orbit, which had caused displacement of the eye and loss of vision. The complaint had begun five years previously, with considerable head-ach, slight pain about the eye, which did not last long, and almost continual flow of tears, which was increased on exposure to the air. At the end of a year and a half the globe began to be protruded, so that a sensible difference of position was observed between the two eyes. In three years, with increasing displacement of the globe, sight became impaired. When I saw this gentleman, the left eye projected about an inch beyond the level of the right, and was at the same time thrust downwards. The upper eye-lid was swelled; it covered the eye, and still retained its power of motion. A hard tumour could be felt in the situation of the lacrymal gland, projecting under the edge of the orbit, close to the bone, and hardly movable. The largest print could not be distinguished with the left eye. I removed the tumour in June, making a long incision from the nose to the temple, and a shorter one over the forehead, meeting the former at right angles. The diseased gland was equal in size to a large walnut, slightly tuberculated on the surface, of a light yellowish brown colour, firm, and nearly homogeneous in texture, but not so hard as scirrhus, connected by loose cellular tissue to the surrounding parts, and by a short close texture to the bone. Free bleeding took place during the operation, but no vessels were tied. The wound was united by sutures, and covered with a rag dipped in cold water. It united throughout by the first intention, and the patient was able to go out and attend to his affairs in a week, at which time the globe had receded into its place. At the end of November the position of the eye was nearly natural, and the patient could read with it the leading article of a newspaper. It was not deficient in moisture; but no tears came from it in weeping. When I saw this gentleman, between one and two years after the operation, he continued perfectly well: as he resides in London, I should, no doubt, have seen him, if there had been any return of disease.

Hydatid of the lacrymal gland, (hydatis glandulæ lacrymalis; glandula lacrymalis hydatoidea.) SCHMIDT, and after him BEER, have described the formation of true hydatids as occasionally occurring in the lacrymal gland. It must be difficult, if not impossible, to determine the exact nature and original seat of such a disease, or of a simple watery cyst developed in the gland. Nor is the diagnosis important; as the symptoms and treatment will be essentially the same, whether these diseases have begun in the gland or in the neighbourhood. When the swelling, by its increase, causes displacement of the eye and imperfect vision, it must be treated on the same principles as other orbital tumours.

SECTION II.—EPIPHORA, OR WATERY EYE.

The quantity of lacrymal fluid is sometimes greater than is necessary for moistening the surface of the organ: the eye is overfilled, and the redundant tears, which sometimes partially obscure vision, flow over the lower lid, and run down the cheek, especially on exposure to cold wind. This state is called a *watery eye*, or technically, *epiphora*. The latter term, however, is properly applied to the redundancy from increased secretion; while the dripping consequent on defective excretion is more appropriately termed ***stillicidium lacrymarum***.

The secretion of the lacrymal gland is increased whenever the external surface of the eye is irritated, as by cold wind, acrid powders or fumes, and various extraneous matters, whether of mechanical or chemical operation. Inflammation of the eye, whether external or internal, or that of the lids, will have the same effect. Epiphora is often kept up for a long time by chronic external inflammation; and it may occur, in scrofulous patients, to a high degree, without any visible signs of inflammation. Under these various circumstances, there is an obvious cause for the watering state of the eye; viz. irritation affecting the surface of the organ: this is the stimulus which naturally calls forth the secretion of the gland. On removing such causes, the effect ceases; the epiphora goes off in proportion as the eye regains its natural state.

We sometimes see an increased lacrymal secretion, which cannot be traced to any of the causes just enumerated. The eye waters, especially when exerted or exposed to the air; there is no external redness, nor any discoverable exciting cause. In such cases, fatiguing exertion of the organ must be avoided, and attention should be paid to the state of the health. The eyes and the head generally should be washed with cold water in the morning. Astringent collyria, such as solutions of the sulphate of zinc or of copper in rose-water, may be used three or four times daily, the liquid being allowed to pass between the lids, so as to come in contact with the conjunctiva. If these means are unsuccessful, the nitrate of silver in solution may be employed once a day. The citrine ointment may be applied to the edges of the lids, more especially if there should be any alteration of the Meibomian secretion.

Stillicidium lacrymarum, as distinguished from epiphora, may be produced by any causes which interfere with the regular excretion of the tears.

The puncta lacrymalia may be contracted; and I have seen this affection proceeding to such an extent, that it was extremely difficult to discern the situation of the openings. Under such circumstances, the puncta must first be enlarged with the point of a pin; we shall then be able to introduce the slender gold probes of ANEL, and to restore the natural size of the aperture.

In introducing these probes, for the purpose either of opening the contracted puncta, or of examining the lacrymal canals, we must bear in mind the exact direction of these tubes, which do not pass in a straight line from the puncta to the sac, but first proceed perpendicularly, then make a sharp bend or elbow, and afterwards run horizontally, or nearly so, to the sac. The probe, therefore, must be entered perpendicularly downwards in the lower, upwards in the upper lid: it must then be turned and directed almost horizontally to the sac.

Injuries of the lacrymal canals are mentioned as causes of stillicidium lacrymarum. My experience leads me to doubt the correctness of the statement. In a case of carcinomatous ulceration affecting the lower lid, related at page 588, I removed the inferior lacrymal canal. No watering of the eye ensued. I saw a gentleman with ectropium of the lower lid consequent on a lacerated wound. It appeared from his own account, and that of the surgeon who had attended him, that the lid had been quite detached at the inner angle, and had experienced great contusion, followed by partial sloughing. The cicatrix had become fixed to the bone, and thus the lid was drawn downwards, particularly towards the nose. The inner extremity of the tarsus was about twice its proper distance from the nose, and drawn down towards the cheek, so as to evert the inner third of the lid. The inferior punctum, on first view, seemed obliterated; but on close search it was found, so reduced in size, as to be barely visible: from this circumstance, together with the ectropium, it was obviously incapable of absorption. There was not the slightest stillicidium.

I have never seen obstruction of the lacrymal canals except as a consequence of injury, operation, or the pressure of tumours. The use of ANEL's probes, therefore, in reference to these canals, is unnecessary, except in the contracted condition of the puncta.

The most common cause of stillicidium is obstruction of the nasal duct, which may be produced by thickening of its membrane, by stricture, by partial or general obliteration, or by pressure from various diseases in neighbouring parts.

SECTION III.—AFFECTIONS OF THE LACRYMAL SAC.

Capillary aperture in the anterior part of the sac; congenital?—I have seen such an aperture in one instance, that of a boy at school, in whom it seemed to be a natural peculiarity, as no inflammation, nor any other affection of the part, had been noticed. A small drop of clear fluid appeared frequently on the surface of the skin, just below the tendon of the orbicularis. It caused no inconvenience, except the occasional application of the pocket handkerchief. My advice was that it should be left alone.

Inflammation of the internal angle of the eye.—This part may be the seat of erysipelatous inflammation; and the attendant swelling, being over the lacrymal sac, may lead to the erroneous supposition that the sac itself is involved in the mischief. In a mild case the inflammation may subside without any unpleasant result; sometimes, however, it extends to the lids, which become red, swelled, and painful; it may reach the lacrymal ducts and sac, and cause increased mucous secretion, with temporary obstruction to the absorption and excretion of the tears. If it proceeds to suppuration, the matter should be evacuated early, to prevent increase of the collection, and thus diminish the risk of subsequent deformity.

The old writers give the name *anchylops* (or *ancylops*) to inflammatory swellings of the inner angle, whether caused by disease of the lacrymal sac, or of the parts exterior to it; and that of *ægilops* to the same disorder in its ulcerated state. There has been much discussion respecting the exact sense and proper application of these unmeaning terms, which have now become nearly obsolete. Beer, however, calls the inflammation just described, *anchylops erysipelatosa idiopathica;*[*] in the ulcerative stage he names it, *ægilops simplex.*[†]

Acute inflammation of the sac. (*Dacryo-cystitis.*)—The lacrymal sac and duct are susceptible of inflammation in various degrees. The acute idiopathic form of the affection, as Beer has observed, is comparatively rare. The local suffering and the constitutional disturbance are much more considerable than might have been expected from the small extent of membrane which is the seat of disorder. The explanation of the peculiarity is afforded by the vascularity of the membrane, and its inclosure in an unyielding bony receptacle. A dull pain is felt in the corner of the eye, shooting to the nose, and to the eye-ball, and at the same time the lacrymal sac forms a hard, clearly defined, and very sensitive swelling, about the size of a horse-bean. This swelling gradually becomes of a bright red, and will not then bear the slightest touch. The pain is now of the most acute kind, with throbbing and sense of tension, extending from the internal angle to all the surrounding parts of the orbit and head. The internal angle and the palpebræ become swollen by serous effusion, and the latter are tumified as in erysipelas; but the enlargement is firmer. The swelling sometimes extends to the whole side of the face and temple. In this general tumefaction, the circumscribed enlargement of the sac can still be felt, and is usually pointed out by greater prominence and redness. The swelling of the inflamed membrane closes the nasal canal, and prevents the passage of the tears into the nostril; hence dryness of the latter, and watering of the eye. So violent an inflammation seated in the head, and near the eye, may be expected to cause serious febrile disturbance: the general symptoms are of an inflammatory description, sometimes proceeding to delirium at night.

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[*] *Lehre*, vol. i. p. 331.

[†] *Lib. cit.* p. 334.

After a certain time increased secretion takes place from the inflamed membrane, but without bringing the relief that might be expected, because the effused matters are prevented from escaping by the unyielding nature of the surrounding parts. Coagulating lymph may be poured out, and cause obliteration of the nasal canal. Suppuration of the lacrymal sac may occur, with increase of the swelling at the internal angle, and fluctuation; the integuments become prominent, and the swelling bursts if not previously opened. I have seen the skin so distended before the bursting of the abscess, that mortification has ensued. This took place in a female of full habit, in whom the local and general symptoms were most severe. She would not submit to a puncture of the abscess, and the skin sloughed to the size of a shilling. If the abscess burst, or be opened surgically, pus escapes, with which lacrymal fluid may be mixed; or pus may be discharged alone at first, mucus and tears being gradually mingled with it as the inflammation subsides. When the latter has ceased, the discharge consists merely of lacrymal fluid with mucus, the latter being either transparent or opaque; in the latter case it is yellowish, or partially clear with opaque streaks. The opening communicating with the sac, and sometimes, where the collection has been left to burst, being at a little distance from it, is a *fistula lacrymalis*, or more properly a *fistula of the lacrymal sac*. There may be more than one external opening. More frequently the case does not proceed to suppuration and fistulous aperture. The natural secretion of the mucous membrane is increased and altered in appearance, becoming thick and yellow, so as to resemble pus. In this state, it either escapes spontaneously through the puncta lacrymalia, or issues from them copiously when pressure is made on the distended sac. As the inflammation subsides, the secretion becomes less thick and yellow; it then appears semi-transparent, with whitish or yellowish streaks, and at last is a clear mucus. These changes indicate the abatement of inflammatory congestion and tumefaction, and the return of the membrane to its natural state. The sac and duct recover their proper calibre, the passage into the nose is restored, and the complaint is at an end. If the nasal duct should have become permanently obstructed during the acute period, its surface and that of the sac pass into a state of chronic inflammation, attended with increased mucous secretion, which, with the lacrymal fluid, accumulates in, and distends, the sac, forming a tumour in the corner of the eye. Pressure on this swelling occasions the escape through the puncta lacrymalia of the mingled tears and mucus, under various appearances, according to the degree of inflammation in the membrane. A watery state of the eye, with dryness of the nostril, and flow of tears over the under lid, are consequences of such obstruction in the nasal duct.

Treatment.—The severe local and general symptoms attendant on acute inflammation of the lacrymal sac in a robust subject of full habit, require active antiphlogistic means. According to the urgency of the case, blood must be taken by venesection, cupping on the temple, or leeches. The latter, applied over the sac, and in its neighbourhood, will generally answer the purpose. The loss of blood must be repeated, until the inflammation is reduced. Fomentations and poultices are the best local applications. The internal treatment and diet must be the same as in other inflammations.

As soon as the existence of fluctuation indicates that suppuration has occurred, an early and free opening is advisable, as a means of immediate relief from acute suffering; and in order to limit the extent of mischief, we persist in the employment of measures calculated to reduce inflammation. The swelling of the membrane subsides; the discharge undergoes the successive changes already described; the natural course of the tears is re-established, and the opening into the sac closes; or the latter may remain open, if the nasal duct should continue impermeable. We should be contented, in these cases, with opening the sac, and not introduce probes, or attempt to force a passage into the nose. The mechanical irritation of such proceedings cannot but aggravate the already acute inflammation of the mucous membrane. If we pursue a soothing plan, the course of the tears will be re-established, as the inflammatory tumefaction subsides; or, if the intervention of art should be necessary for clearing an obstructed nasal duct, it may be resorted to more advantageously when the general inflammatory disturbance has been removed.

Chronic inflammation of the lacrymal sac.—In this affection, as in the more acute disorder, there is swelling of the inflamed membrane, and consequent interruption to the passage of the tears; hence arise the following symptoms. A swelling of the internal canthus, in the situation of the lacrymal sac; a watering of the eye, so that it is full of tears, which occasionally run over the lower lid and down the cheek, (*stillicidium lacrymarum;*) dryness of the nostril on the affected side, from the absence of the lacrymal fluid. The tumour may be colourless, or more or less red, these differences depending on the degree of inflammation: from the same cause it may be either indolent or painful. In size, it may be equal to a pea, a horse-bean, or a nut: these varieties depend partly on the duration of the affection; however, the sac sometimes enlarges considerably without any apparently adequate cause. Pressure on the tumour causes the contents of the sac to escape through the puncta, or through the nasal duct; the latter event is comparatively rare. Sometimes the contents cannot be forced out in either direction. The fluid thus pressed out varies in appearance, according to the state of the membrane; it may be thick and yellow like pus, or a viscid, opaque, and streaked mucus, or a clear mucous fluid: tears may be mingled with these in various proportions. When the secretion is copious, and the parts free from active inflammation, it may escape from the puncta spontaneously, or in consequence of the slight pressure caused by contraction of the orbicularis palpebrarum. From this increased discharge, the affection has sometimes been called *blennorrhœa sacci lacrymalis.* If the sac be emptied by pressure, it will fill once, twice, or oftener, in twenty-four hours. Patients sometimes content themselves with this simple mode of relief in preference to a surgical operation.

When disease of the sac has been kept up for some time by obstruction of the nasal duct, the affection generally extends to the palpebræ, of which the mucous lining is found red and villous, with some mucous discharge, and more or less affection of the Meibomian glands, the lids being in some instances agglutinated during the night. The inflammatory disturbance may extend to the surface of the eye generally; but the condition of the latter varies considerably in different instances, and in the same individual at different times. If the atmosphere is mild or warm, and the eye not excited by exertion, there is no watering nor any inconvenience. Exposure to cold air, and especially to sharp winds, causes increased secretion of tears, which occasion serious annoyance by irritating the eye, and flowing abundantly over the cheek. In some cases the eye is permanently irritable, and becomes inflamed from slight occasional causes, such as employment in reading, writing, or other modes of exertion. The lacrymal sac too, is liable to attacks of more considerable inflammation, in which the eye is often involved. In the course of such attacks, the sac may become distended, inflame and ulcerate; an external opening or fistula will thus be produced.

The circumstance more particularly deserving our attention in these cases, is the degree of inflammation; the affection being originally inflammatory, and the obstruction being kept up by the inflammation. The increased secretion, or blennorrhœa, proceeds from the inflamed mucous membrane, and the obstruction is from the same cause, which produces tumefaction of the membranous lining, and consequently diminished calibre or closure of the duct. The writers on surgical operations have not, in general, taken a proper view of the subject; having directed their attention merely to the obstruction, and the mechanical means of removing it. The disorder is considered under the head of *fistula lacrymalis*, which, instead of being an essential circumstance, is merely an occasional concomitant.

In his work on diseases of the eye, SCARPA appropriates one chapter to this affection, of which he takes what appears to me a very erroneous view. He says that "the curdy viscid humour mixed with the tears, which in the first instance flows back again through the puncta lacrymalia, is not formed by the sac, as is commonly believed; but is for the most part transmitted to it from the eye-lids by the puncta lacrymalia, from which it regurgitates upon the eye whenever the sac, which is gradually filled with it, is pressed upon. This puriform humour is principally furnished by the internal membrane of the palpebræ, and comes more particularly from the lower eye-lid along the tarsus, and from the glands of MEIBOMIUS: the sebaceous matter peculiar to those glands, being not only secreted in larger quantity, but also acquiring an acrid and irritating quality, according to the general state of the habit, with which they participate." He states, "that the lacrymal sac has no other share in the disease than that of receiving and retaining, together with the tears, the puriform humour which is transmitted to it from the affected palpebræ." He considers that the palpebral mucus is so tenacious, and the Meibomian secretion so thick, that they lodge in the sac and duct, and thus produce obstruction. In conformity with these notions, he calls the disease *puriform flux of the eye-lids*, (*flusso palpebrale puriforme;*) and he shapes his practice accordingly, employing astringent washes to the palpebral linings, and stimulating ointments to the ciliary margins to correct these vitiated secretions. Although these means may be employed with advantage, in some cases, and after other measures, I consider the pathological views, on which they rest, to be entirely unfounded, being convinced that the lacrymal sac and nasal duct are the original and essential seat of disease, while the palpebral affection, when it exists, is only secondary.

Is it probable that fluids, which can pass through the small lacrymal puncta and canals, will stick in, and block up, the much larger nasal duct? In many affections of the lids, such as inflammation and ulceration of their margins, catarrhal, purulent and gonorrhœal ophthalmia, there is increased secretion, often very abundant, and generally viscid; but the lacrymal passages do not become obstructed. Again, in lippitudo and psorophthalmia, where the Meibomian secretion is much altered, no disease of the sac or duct takes place. On the other hand, the palpebræ may be perfectly healthy when the nasal duct is obstructed.

Treatment.—Our first object, the removal of inflammation, may be accomplished by the application of leeches over the sac, and other corresponding measures. We shall thus prevent the enlargement of the sac, suppuration, ulceration, and fistula, as well as the extension of disorder to the eye. Under these means the swelling of the membrane often subsides, the increased secretion ceases, and the passage of the tears into the nose is restored. If obstruction of the duct, and consequent distension of the sac should continue after inflammation has been removed, the patient should empty it occasionally by gentle pressure in the corner of the eye. The treatment recommended by SCARPA may be advantageously pursued under such circumstances; that is, we may use astringent lotions, and stimulating ointments to the lids. Solutions of the sulphate of zinc, sulphate of copper, or nitrate of silver, answer the former purpose: they may be employed at first in the strength of two grains to the ounce of distilled water. The sac having been previously emptied by pressure, and the mucus removed by a soft handkerchief or rag, two or three drops of the astringent collyrium should be placed in the corner of the eye, from which it will be absorbed by the puncta, and conveyed into the sac. It is unnecessary to impel it directly into the latter; indeed the use of ANEL's syringe, the point of which is sufficiently small to enter the puncta, often aggravates the mischief by its mechanical irritation. The citrine ointment, that of red precipitate, or the ointment of JANIN (see page 161) may be applied occasionally to the edges of the lids. By such management we may remove the unpleasant effects of the complaint, although obstruction of the duct may continue, with occasional flow of tears over the cheek, and may require pressure on the sac from time to time to prevent its distension.

The lacrymal sac is sometimes distended without permanent obstruction of the duct. In an elderly woman, of spare habit, the left sac formed a conspicuous tumour in the corner of the eye, without redness or pain, so large that the receptacle must have been three or four times the natural size. On moderate pressure the contents descended into the nostril, and flowed out of the nose if the head were held forward. The fluid thus evacuated consisted at first of mucus with yellow streaks; after surgical treatment, it was a clear mucous fluid The complaint had existed seven or eight years, and caused but little inconvenience.

Permanent obstruction of the nasal duct.—This may take place as a consequence, either of acute or chronic inflammation; or it may be produced by extension of disease from the nose. It occurs occasionally in the latter way, in strumous children: inflammation begins in the Schneiderian membrane, and then creeps on to the lining of the sac. The general management, and the internal remedies recommended for strumous ophthalmia, particularly the sulphate of quinine, may be advantageously employed in strumous inflammation of the lacrymal sac.

Inflammation of the sac and obstruction of the nasal duct are occasional consequences of small-pox in children.

If permanent obstruction of the duct should cause repeated inflammations of the sac and of the eye, and if these inconveniences cannot be prevented or removed by the means already pointed out, we must resort to further measures for restoring the passage of the tears into the nose. Much mischief may ensue from neglect. The sac may ulcerate, so as to form a fistulous aperture, giving issue to mucous discharge and tears; this may be either a simple opening, or complicated with thickening of the surrounding cellular tissue, redness of the integuments, or an unsightly growth of fungous granulations. Continued distension of the sac may lead to slow enlargement, in which it forms a swelling in the corner of the eye, as large as a bean or a nut, without change of colour in the skin. The swelling is soft, and yields to the pressure of the finger, under which its contents, consisting of tears mixed with transparent, or yellowish streaked mucus, escape through the puncta or the nasal duct. To this state of the organ BEER[*] has given the inappropriate name of rupture of the sac, (*hernia sacci lacrymalis:*) it has been also called *mucocele*.

If the swelled sac feels firm and resisting, without fluctuation, or with only a very obscure sense of it, and if it cannot be emptied by pressure, BEER calls the case dropsy of the sac, (*hydrops sacci lacrymalis.*[†]) This and the former affection are both comprehended by SCHMIDT[‡] under the common name of *varix* of the lacrymal sac. BEER says that in the dropsical affection the sac continues to enlarge, and that it may reach the size of a pigeon's egg; that, as soon as the swelling has attained the magnitude of a bean, the integuments become of a livid red, the colour growing deeper as the swelling enlarges; that it is quite indolent, and resists pressure; and that the cavity is filled with a secretion like thick glue. Such a state of the sac, in respect to size and contents, has not come under my observation.

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[*] *Lehre*, vol. i. § 367 and 588; vol. ii. p. 151—183.

[†] *Loc. cit.* In the 41st number of the *Chirurgische Kupfertafeln*, there is a plate (pl. 208) by Professor VON AMMON, of Dresden, with coloured figures, in which it is attempted to show the external characters of the swellings in the corner of the eye caused by various affections of the lacrymal sac.

[‡] *Die Krankheiten des Thränenorgans*, p. 310.

Although caries of the os unguis is spoken of as a frequent occurrence in observations on fistula lacrymalis, I do not remember to have seen it as a consequence of disease commencing in the sac.

Treatment.—A great variety of means have been proposed for removing obstruction of the nasal duct: they are usually mentioned as operations for fistula lacrymalis, although in the great majority of instances, there is no fistulous opening. A description and consideration of all these proceedings would fill a moderate volume; but it may be well omitted, as the greater part are obsolete.*

Before performing any such operation, we must ascertain that there is a permanent obstruction, which cannot be removed by other means. If the inflammation of the sac be treated on the principles already explained, the cases requiring operation will be very few. We should avoid it as long as we can, because it is a temporary and imperfect remedy. If we merely clear away the obstruction, it will probably soon recur. To avoid this, the patient must submit to the inconvenience of wearing a foreign body in the duct, to maintain it in a pervious state.

ANEL, a French surgeon, who invented the small probes for the puncta, devised a syringe with a fine point for injecting fluid into the lacrymal sac, and thus forcing the obstruction of the duct.† When the latter is so slight that it gives way to the pressure of the finger on the distended sac, and allows the contents to pass into the nose, it might also yield to the syringe. But the force exerted by the latter is altogether insufficient to overcome the ordinary permanent obstruction of the nasal duct. Indeed, the fluid thrown in at one punctum escapes by the other: we can prevent this by compressing the other lacrymal canal; but the inadequacy of the power to the intended effect remains. The small probes, introduced through the puncta, have been employed to clear the obstructed nasal duct. When the probe has entered the sac through the inferior canal, it should be raised from the horizontal to the perpendicular position, which the looseness of the lid allows, and then carried through the nasal duct into the nose. The extremities of these probes are, however, so small, that they easily become entangled in the irregularities of the membrane, so that we cannot readily judge whether the instrument is stopped by that cause, or by the obstruction in the duct. By pushing it, in the former case, we wound the membrane, and drive the instrument between it and the bone. Even if we conduct it safely to the obstruction, in which object failure may often be expected, from the necessary change in the direction of an instrument going first through the lacrymal canal, then through the sac and duct, it is badly calculated in size and strength for forcing the obstructed part. The small opening effected by it is inadequate to the transmission of the tears, and will soon close again. I therefore consider the employment of ANEL's probes in this way more likely to do harm than good.

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* J. L. PETIT, *Traité des Maladies Chirurgicales*, tom. i. p. 327--404. J. D. METZGER, *Curationum chirurgicarum, quæ ad fistulam lacrymalem hucusque fuere adhibitæ, historia critica*, 12mo. Monaster. 1772. SABATIER, *Médecine Opératoire*, nouvelle edition, 1822, tom. ii. p. 206—261. *Dictionnaire de Médecine et de Chirurgie pratiques*, art. FISTULES, tom viii. p. 179--214. JUENGKEN, *die Lehre von den Augenoperationen*, Kap. xxii.; *Operatio fistulæ lacrymalis*, p. 406--490.

† *Nouvelle méthode de guerir les fistules lacrymales; et recueil de differentes pieces pour et contre la méthode.* Turin, 1713. *Dissertation sur la nouvelle découverte de l'hydropisie du conduit lacrimal.* Paris, 1716.

It has been proposed to fill the lacrymal sac with quicksilver, by means of a glass tube, with a steel stopcock, terminated by a steel tube sufficiently minute to enter the puncta and lacrymal canals.* It has been expected that the weight of the metal thus conveyed into the sac, would cause the obstruction to give way. As the cavity of the sac does not exceed the size of a garden-pea, the force thus applied would certainly cure no obstructions which would not have got well of themselves. A more considerable power, corresponding in degree to the height of the column, may be applied in the act of injecting the sac, if the escape of the mercury through the other punctum be prevented by compressing the corresponding canal. If the obstruction does not yield to this power, we cannot expect it to give way to the weight of the small globule contained in the sac.

As the nasal duct, after having been cleared and enlarged, will contract again, it has been proposed, in order to prevent such relapse, and to maintain a permanent passage for the tears, to introduce, through an opening in the lacrymal sac, a gold or silver tube, and to leave it there. In length and size the tube must be accommodated to the nasal duct and the adjoining portion of the sac. Its upper end, which is a little expanded, rests in the lower portion of the lacrymal sac, while the lower extremity, terminating in an aperture cut obliquely, should clear the opening of the nasal duct.* In order to introduce it, the lacrymal sac must be laid open. The tendon of the orbicularis palpebrarum is the guide for this incision. The distended sac must be punctured below the tendon with a double-edged pointed knife, the point of which is directed towards the cavity of the sac. If the mere puncture does not make a sufficiently ample opening, the knife may be carried downwards and outwards in a direction parallel to the edge of the orbit. The escape of mucus and tears shows that the sac has been opened. A silver probe is carried through the opening thus made in the sac, and into the nasal duct, not perpendicularly downwards, but a little backwards and inwards; the inclination backwards being just such as the projection of the eye-brow would give to a probe passed into the nasal duct from above. We shall meet with resistance at the point of obstruction, and we must employ a gradually increased pressure to overcome it; the probe then goes on into the nose, from which, on using a handkerchief, a little blood escapes. If we cannot force the obstruction with the blunt end of the probe, we must have recourse to the sharp point. The resistance may be so great, as to render it advisable to desist, and repeat the attempt after an interval of two or three days. The tube is placed in the nasal duct by means of a steel stilet, bent at a right angle, of which the portion beyond the bend corresponds to the cavity of the tube. The latter must be fairly lodged in the duct, with its upper or expanded portion occupying the lower part of the sac. The skin heals over, the tube provides an artificial passage for the tears, and the immediate result of the operation appears very favourable. Unfortunately, the future history of these cases is not equally satisfactory. We could hardly expect *a priori* that a metallic tube would permanently answer the purpose of the natural duct We find accordingly, that the artificial substitute, after the lapse of some months, gets out of its place, rising too high, or sinking too low, or that it becomes obstructed. It causes inflammation in some instances, and in others, pain more or less severe, an intolerable aching in the corner of the eye and cheek, which cannot be remedied without removing the tube. I have seen all the inconveniences now enumerated resulting from this practice, and have found it necessary, on account of them, to remove tubes which had been introduced by others, a proceeding often attended with considerable pain. That the necessity for such removal is not a very rare occurrence, may be inferred from the circumstance of the Baron Dupuytren having devised means expressly calculated for the extraction of the tubes. In one case, after removing the tube, I found it filled with a slender production of the mucous membrane exactly like a mucous polypus, entering above, and extending nearly to the lower end of the tube.* That the method, although strongly recommended by Mr. Wathen, was not permanently successful, may be inferred from the circumstance that his partner, Mr. Ware, subsequently proposed and advised another mode of proceeding.

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* *A new method of treating the fistula lacrimalis*, by Mr. (now Sir WILLIAM) BLIZARD, in the *Philosophical Transactions*, vol. LXX. p. 239.

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* The employment of the tube, proposed in France by PELLIER DE QUENGSY, in his *Recueil de mémoires et d'observations sur les maladies de l'œil*, Montpelier, 1783, was strongly recommended in this country by Mr. WATHEN, in "*A new and easy method of applying a tube for the cure of fistula lacrymalis.*" 4to. London, 1781; second edition, 8vo. 1792. In this work, the tubes and the other means connected with their employment, are minutely described and figured.

The same plan is followed exclusively by BARON DUPUYTREN, whose method, with the forms and dimensions of the tube and subsidiary apparatus, are detailed in the two works already quoted, see note, p. 711. The instruments employed by DUPUYTREN are delineated in FRORIEP's *Chirurgische Kupfertafeln*, No. XXX. pl. 147.

Beer recommends the employment of catgut to enlarge the constricted duct. The sac must be opened, and the obstruction of the duct removed in the manner already described. A piece of catgut is then to be introduced into the sac, and passed through the duct into the nose, when it will either present itself at the nostril, so that it may be drawn out with forceps, or it must be forced out by the patient blowing his nose. The extremity of the catgut, thus brought out at the anterior aperture of the nostril, is to be fixed by sticking plaster in a convenient position near the ala nasi; and the rest of the string may be fastened in a coil to a cap or may be fixed on the brow by a turn or two of a narrow roller. Every day a fresh portion of the catgut is drawn down through the duct, and that which had been there the previous day is cut off, the extremity being fastened as before. After thus consuming a piece of catgut of the ordinary length and size of the fiddlestring E, Beer commences with a similar length of the string A, and then with the string D. When this has been passed through, he considers the cure completed, and allows the opening into the sac to heal.

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* *Lehre*, vol. ii. in the chapter *on the hernia sacci lacrymalis, and hydrops sacci lacrymalis*, p. 151—183.

The method, proposed by Laforest,[*] of examining the nasal duct, and removing obstructions in it by means of instruments introduced at the inferior orifice, which seems hardly to have been employed, except by the inventor, has been again brought into notice by Mons. Gensoul, of Lyons, whose mode of proceeding is thus mentioned in the *Dictionnaire de Médecine et de Chirurgie pratiques.*[†] "M. Gensoul employs the escharotic method in most cases of fistula lacrymalis, making his applications by the inferior orifice of the nasal canal. He filled that canal, in the dead body, with fusible metal, which, being removed when cold, by breaking away the bone, afforded a model for probes, capable, as he says, of entering and passing the canal with the greatest facility. When the application of caustic is required, the instrument is formed into a porte-caustique analogous to that employed by Ducamp in strictures of the urethra. The probe is bent, nearly at a right angle, about nine or ten lines from its extremity; near this curve there is a slight lateral inflexion, the direction of which must be opposite for the two nostrils; it corresponds to the projection of the nasal process of the superior maxillary bone. M. Gensoul represents that his probe passes into the lacrymal sac as easily as a catheter into the bladder."

The mode of proceeding, which I consider the most eligible, as combining the advantages of efficiency, simplicity and complete safety, is that introduced by the late Mr. Ware,[‡] of placing in the lacrymal sac and duct, what he calls a nail-headed style, that is, a cylindrical piece of silver, about the thickness of an ordinary probe, long enough to reach from the corner of the eye to the termination of the nasal duct, with a head like that of a nail placed obliquely at its upper end, which is a little curved, so that the style may sit close in the corner of the eye. The sac must be opened by an external incision below the tendon of the orbicularis palpebrarum, and the obstruction of the duct must be cleared by adequate pressure with a probe, as in other modes of proceeding. The style may then be introduced, taking care that its head is secured, so as to prevent it from sinking into the wound, as it is intended that this head should rest on the integuments in the corner of the eye, where, being blackened, it appears as a small black patch. Instead of introducing the style immediately, I prefer placing a portion of bougie in the duct, turning down its upper end, so as to prevent it from sinking into the sac. The small end of the smallest bougie will answer the purpose; the length should be an inch and a half, or rather less. In one or two days this should be removed, and the passages may be cleared by gently injecting a little tepid water through the wound by means of ANEL's syringe, on which a blunt end is screwed when it is employed for this purpose. Another piece of bougie, of the same or a larger size, is then introduced, and this plan is continued, with a gradual increase in the size of the bougie, for a week or ten days. The external orifice will now be reduced to a small round opening, through which a little mucous discharge may escape, and the style may be substituted for the bougie. The patient soon learns to remove and replace the style; and he takes it out and cleans it, from time to time. It might be supposed that the passage of the tears would not be assisted by introducing a solid substance into the duct. Experience, however, shows us that the fluid takes its natural course, when a style is thus kept in the lacrymal passages, and the enlargement of the urethra round a catheter left in the canal affords an explanation of the circumstance. The style, indeed, becomes so loose, that it sometimes falls out when the head is bent downwards. As the presence of the instrument causes neither pain nor inconvenience, I recommend patients to wear it permanently. According to my experience this method maintains the natural course of the tears with the least trouble to the patient.

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[*] *Nouvelle méthode de traiter les maladies du sac lacrymal; Mém. de l'acad. de chirurgie*, tom. ii. p. 175. The instruments are represented in plate xiii.

[†] Tom. viii. p. 210.

[‡] *Observations on the treatment of the fistula lacrymalis*, 8vo. London, 1798. These observations are reprinted, together with an *Essay on the epiphora or watery eye*, and *additional remarks on the epiphora*, in a volume of tracts on the eye, published after the death of the author by his son, Mr. Martin Ware. Plate ii. of this volume contains figures representing the styles.

If there should be fistula of the lacrymal sac, some modification of the proceeding may be necessary, such as a previous slitting of the fistulous track; or this may be done at the same time with the opening of the sac.

Complicated contrivances for compressing the enlarged lacrymal sac, and thus reducing it to its proper dimensions, are described and delineated in surgical works; I must doubt whether they have been employed, as they seem ill calculated to answer the intended purpose. Of one thing I am certain; that the annoyance of wearing such machinery would be much greater than the inconveniences incidental to the complaint.

The various proposals for conveying setons into the nasal duct from the nose, and for attacking the constricted portion with escharotics or the actual cautery, are either obsolete or inappropriate, and therefore do not require detailed consideration.

When inflammation of the sac occurs repeatedly, and the nasal duct is obliterated, so that the foregoing methods are inapplicable, it has been recommended to expose the cavity completely, and to destroy the mucous membrane by the actual cautery, by pure pot-ash, or some other escharotic. Another method, suggested under similar circumstances, is that of perforating the os unguis, so as to make a direct opening into the nostril. I have seen no cases requiring such proceedings.

Obstruction of the duct may arise from syphilitic disease of the nose; from caries or exostosis of the surrounding bone; from morbid growths of various kinds, originating in the nose or antrum. Suppuration and ulceration of the sac, with fistulous openings, may ensue in such cases, which admit of palliative relief only.

ADDENDA.

PAGE 295.—Closure of the pupil is called *Synizesis*, a Greek word, (*συνιζησις*, collapse, sinking in.)

Page 382, end of CHAPTER XXI.—*Watery cysts of the sclerotica.*

CASE I. *Small watery cyst in the sclerotica of a child; successfully treated by cutting away the prominent portion of the cyst.*—A child, ten years old, had a semi-transparent firm oval swelling, as large as a small pea, on the sclerotica, close to the margin of the cornea, where its existence had been noticed for some years. There was no change in the conjunctiva. It had been punctured; watery fluid escaped, and the accumulation was soon renewed. Two or three gentlemen, who had seen the case, advised that no further proceeding should be resorted to. As the swelling already constituted a slight blemish, and was increasing in size, my recommendation of an operation was readily adopted. I punctured the cyst, and then cut away its prominent portion with curved scissars. It was thin but tough, the sides being firm enough to retain the figure of the swelling after it had been opened. The interior was smooth, and a small round aperture was seen in the middle of the basis, apparently passing through the sclerotica. The surface exposed by the operation slowly healed over without any unpleasant symptom, and the blemish was completely removed. At the distance of two years from the operation, the eye continued perfectly well.

CASE II. *Larger cyst of the sclerotica; excision of its prominent portion.*—A gentleman, about thirty years of age, of robust frame and full habit had lost one eye by violent inflammation, which had caused extensive opacity of the cornea, with adhesion of the iris. A cyst formed in the sclerotica, and slowly acquired the size of an almond, not only increasing the deformity, but also causing irritation in the motions of the globe and lids. I removed the exterior portion of this bag, as in the last case; but I did not see the patient again.

Page 325.—An interesting case of retinitis, with temporary loss of sight, caused by lightning, is recorded in the second volume of the *London Medical Gazette*, p. 58, 59. JANE HUMPHREYS, eleven years old, was standing on the 6th of May, 1828, in a school-room, with her left side toward the window, when a storm came on, and the room was strongly lighted up by a flash of lightning, which produced instantaneous loss of sight in the left eye, with tingling pain in the globe. As the pain increased during the following days, Mr. MAYO was sent for. Repeated leechings on the temples, blisters behind the ear and on the back of the neck, and mercury, so as to affect the mouth, were employed by his directions: under this treatment there was visible daily progress towards recovery.

The symptoms on the 11th of May, were sense of heat in the eye-ball and tenderness on pressure; inability to raise the upper lid; extreme sensibility to light, when the eye-lids were held open; vision almost extinct. There was no increased redness, nor any change in the transparent media. Pain and tightness across the forehead; throbbing in the head; white tongue; frequent pulse.

May 20. Objects could be distinguished; total want of power to raise the upper lid; she could bear the light when the lids were opened.

24. The power of the levator palpebræ superioris was restored.

27. Although the left eye appeared sound, and was used habitually with the other, it was weaker than before, and somewhat painful when exercised. She could read ordinary print with it when held near to the eye, or distinguish a pin and pick it up from the ground; but the faculty of distinguishing colours was lost. In a yellow silk handkerchief, spotted with scarlet, she could point out the spots; but they appeared to her black, and the ground less black. She described white paper as a shade of black, and the leaves and petals of a rose as a deeper shade.

Page 327.—*Choroiditis.*

Mr. MACKENZIE, of Glasgow, has published in the *London Medical Gazette*,* a short statement on the utility of arsenic in this affection. The following symptoms denote the presence of the disease, which, he says, might, perhaps, be more properly called *Sclerotico-choroiditis.*

"1. Varicose dilatation of one or more of the arteries derived from the recti muscles, the enlarged artery or arteries ending in a broad lash of small vessels near the edge of the cornea. It may be the arteries from the upper, lower, outer, or inner side of the eye, which are thus affected. The upper and outer sides, however, are more liable than the inner or lower.

"2. Under these vessels, the sclerotica has at first the appearance of being thickened, but after a time is evidently thinned, so as to allow the dark choroid to shine through it, of a livid colour.

"3. By-and-by a protrusion, or several separate protrusions of the choroid, take place, through the extenuated sclerotica; a symptom to which the term *sclerotic staphyloma* has been applied.

"4. Dislocation of the pupil; this aperture moving towards the affected portion of the choroid, in some cases so much as to be placed behind the edge of the cornea. This symptom is not constant.

"5. Specks of the cornea, especially towards the edge next the affected part of the sclerotica and choroid.

"6. If completely uncontrolled, the disease ends in general enlargement and protrusion of the eye, the cornea becoming totally opaque, the whole sclerotica thinned, and the choroid exposed; so that the eye is of a deep blue colour, with varicous vessels streaming over it."

Two wood cuts are added to illustrate some points in the foregoing description.

Mr. MACKENZIE has employed the arseniate of potass, beginning with the thirty-second part of a grain, in the form of pill, thrice daily. Under this remedy, he says, "I have had the satisfaction, in a number of instances, to observe the varicose vessels to shrink, the blueness to become whiter, the tumour of the sclerotica and choroid to fall, and the patient's health and vision to improve." He considers that the favourable effect on choroiditis of a remedy known to exert con-

* Vol. xii. p. 18.

siderable influence on some obstinate cutaneous diseases, corroborates the analogy, in certain points of structure, between the choroid and the rete mucosum.

Page 332.—*Internal inflammation of the eye consequent on fever.*

The observations of Mr. WALLACE, respecting the efficacy of bark in this affection, are confirmed by the testimony of Dr. REID in the following passage. "On my first noticing this affection of the eye, as a sequela of fever, I was informed by Mr. WALLACE of this city, that in some cases of a similar nature, which came under his treatment, he had found small doses of Peruvian bark the most efficacious remedy. I therefore immediately adopted his suggestions, and with ultimate success, in all the cases which came under my care. There were two patients with this form of disease, to whom I gave preparations of bark: after a few days the ophthalmia certainly disappeared, but they had a relapse of fever in an aggravated form." *Clinical observations made during the epidemic fever of* 1826; in the *Transactions of the Association of Fellows and Licentiates of the King and Queen's College of Physicians*, vol. v. p. 294.

This species of internal ophthalmia has been described by Dr. JACOB, of Dublin, in the work last quoted.* This gentleman and Mr. WALLACE agree very nearly in what they say respecting the history and symptoms of the disease; but on the subject of treatment, particularly in reference to the powers of bark and mercury, their evidence is completely contradictory.

Dr. JACOB had met with seventy or eighty cases of the disease within the year. He had not seen it at a later age than forty-five; and of thirty cases, in which the ages were noted, three only were above twenty-five. It is more frequent among the poor than the rich, and among females than males. Children are not exempt; cases having been seen at three, five, and seven years of age. It came on generally within six weeks or two months after recovery from fever; sometimes earlier, sometimes at the end of four, five, or even eight months. It affects only one eye. Dr. J. does not remember seeing any case in which both suffered. Symptoms of retinal affection occur first, and the inflammation supervenes in six, eight or ten days: the interval is sometimes longer, even to two months. "In this inflammation the transparent parts are rendered more or less clouded or opaque; the cornea especially has its margin or circumference almost always of a whitish or grey appearance, presenting an opaque circle resembling the arcus senilis. The anterior chamber of the eye appears clouded, independent of the opacity of the cornea, arising probably from thickening of the membrane of the aqueus humor; this cloudiness is sometimes general, sometimes it presents a muddy patch behind the cornea as in syphilitic iritis. In the worst form of the disease the lens itself becomes partially opaque, reflecting light falling obliquely upon it, and presenting an opaline amber colour; indeed it is in this way I have observed vision to be destroyed when the disease has been fatal to the organ." The iris is always altered in colour, and loses it brilliancy; but Dr. Jacob has not seen it assume the decided yellowish green, observed in some other inflammations; nor has he observed the formation of abscesses or tubercles of lymph. Hypopyon sometimes occurs, but not as a consequence of more intense inflammation; on the contrary, it is seen in very mild cases, even when the pupil contracts on exposure to light. The pupil is slightly irregular, but does not contract adhesions, or become closed: often the iris moves actively. A stinging or aching pain darting to the temple or nose is generally present, often there is little or no suffering. Intolerance of light is generally present, with lacrymation and severe pain on exposure to strong light. "Vision is in all cases much impaired; some cannot read print of moderate size, others cannot distinguish large capital letters, others are unable to see a key, or other large object, held at a short distance from the eye, while others can only distinguish light from darkness. I have not observed that the degree of injury to vision was proportioned to the extent of the inflammation; the cases of mildest appearance being sometimes attended by the most defective sight. The patient can seldom distinguish all the prismatic colours, deep blue and green generally appearing black."

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* *On internal inflammation of the eye following typhus fever*, p. 468—478. This paper, read in January, 1828, was published in the same year. Mr. WALLACE's essay was read in December, 1827, and published in 1828.

"The treatment of this inflammation of the eye is not attended with much difficulty. Bleeding, locally or generally, in proportion to the urgency of the symptoms; blistering, where there is much pain or intolerance of light; purgatives, antimonial medicines, and opiate stupes, are obvious means of relief." Dr. Jacob strongly advises the use of belladonna, and adds, "I do not, however, by any means recommend that the surgeon should depend on these remedies alone; on the contrary, I believe that they will prove ineffectual in the majority of cases, and therefore we must have recourse to mercury, which has been found so valuable a resource in other cases. In my own practice I have found the relief from the use of mercury so certain and decisive, that I have trusted to it almost exclusively, with the assistance of the belladonna. I have generally found that two grains of calomel with a quarter of a grain of opium, three times a day, answered every purpose; and in the majority of cases I produced the necessary mercurial action, as marked by tenderness of the gums, in eight or ten days, by the use of three, four, or five grains of the blue pill alone, three times a day; and if the pain should be severe, combining hyoscyamus or belladonna with the dose taken at bed-time. I have heard that the sulphate of quina has been administered with advantage in these cases; but as my experience of its efficacy is not considerable, I cannot speak of it with any certainty. In two cases which I saw after the inflammation had subsided, and in which vision was as much impaired as if no remedies had been adopted, bark in powder had been administered for ten days. I gave trial to the sulphate of quinine myself in four well marked cases for eight days, but finding no relief, had recourse to mercury, which effected a cure in the usual time."

Page 364.—*Dry conjunctiva.*

Professor von Ammon has given a good account of this singular and rare affection, under the name of *Xerosis conjunctivæ*, in the first volume of his *Zeitschrift für die ophthalmologie*, accompanied with a detailed history and description of some cases, which had come under his observation.[*] His attention was first directed to it by professor Jaeger of Erlangen, who called the disease "*Ueberhäutung der conjunctiva*, that is, *skinning over of the conjunctiva*.[†] The resemblance which the surface of the membrane presents to that of the cuticle is denoted in the name employed by Mr. Travers of *cuticular conjunctiva*.[‡]

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[*] *Beobachtungen, Ansichten und Zweifel über die Entstehung der Xerosis conjunctivæ*, art. vi. p. 65.

[†] *Bericht über die chirurgisch-augenärztliche Klinick* vom Jahre 1828—1829; in the *Medicinisch-chirurgische Zeitung*, 1830, vol. i. p. 31. The inaugural dissertation of Dr. Klingsohr, *die Ueberhäutung der Bindehaut*, with a coloured plate, Erlangen, 8vo. 1830, was written at the suggestion of Professor Jaeger; see Ammon's *Zeitschrift*.

[‡] *Synopsis of the diseases of the eye*, p. 120.

In a patient, who has had the complaint some years, there is partial symblepharon, especially at the internal canthus, where the lids adhere to the caruncula, and to each other. In one eye both puncta lacrymalia are closed; the lower punctum is closed in the other eye. The lids cannot be closed on account of the symblepharon. Contraction of the tarsus, with partial trichiasis exists in both upper lids. The palpebræ cannot be drawn away from the globe, on account of the symblepharon. When an attempt is made to raise the upper, the conjunctiva is drawn into folds below the cornea. The conjunctiva oculi is quite dry, and of a dirty white dead appearance, which is particularly remarkable over the cornea. The form of the latter is regular, and the blue iris can be distinguished through it, though the outline of the pupil is not seen clearly. The eyes are so insensible, that they can be rubbed pretty strongly with the finger without exciting pain. Warm water is used to the eyes, and agrees with them better than cold. In former time this patient had suffered much from inflammation of the eyes, connected with entropium of the upper lids. Another patient, forty-seven years of age, had experienced in childhood repeated attacks of strumous ophthalmia, and had suffered much from inflammation of the eyes, with entropium, in the last twenty years. In the left eye, the lids adhere to each other and to the caruncula at the internal canthus. The puncta are closed; their situation being visible. Partial trichiasis exists in both lids; the upper is so shortened, that the eye cannot be closed, producing the state of lagophthalmos. When the lids or globe are moved, the conjunctiva oculi is thrown into folds. The latter membrane is dry, dirty, and as if covered with dust: it is white, and firm, but moist at the angle of reflection from the globe to the lids. No vessels are perceptible in the membrane. No moisture is perceived on rubbing the cornea. The iris can just be distinguished; but the margin of the pupil is not perceptible. The patient can see objects with this eye; but they appear enveloped in a thick cloud. She sees better in moonlight then in sunshine. If she weeps, no tears flow on this side; but the eye becomes prominent, blood-red and painful, and copious lacrymation occurs on the other side. The eye does not bear cold, nor cold with moisture; but washing with warm water is agreeable. The patient often feels a dryness, as if sand were between the lids. In the right eye the tarsi are contracted, and the cilia inverted; the conjunctiva round the cornea is partially elevated, and forms folds; the cornea obscure. The lacrymal secretion is natural.

Professor von Ammon has some further observations on the subject in the second volume of his *Zeitschrift*, p. 381. He relates a case, of which the principal circumstances correspond to those of the preceding instances. The patient, a female twenty-seven years old, had suffered in her early years from strumous ophthalmia, for which no other remedy but the ointment of red precipitate had been employed. When grown up, she laboured under chronic ophthalmia with trichiasis. The puncta are closed, the palpebræ and caruncula grown together; the conjunctiva dry, and almost scaly over the cornea, which is so obscure that the colour of the iris and the state of the pupil could not be distinguished. Painful pressure is experienced in the eyes, with redness, in weeping, but no tears flow. The patient is most comfortable in cold weather, and most uneasy in the heat of summer. Bathing with clear water and milk agrees best with the eyes.

A case of the affection, in a less advanced state, is related by Mr. Mackenzie in the *London Medical Gazette*, vol. xii. p. 44, under the name of *Xeroma conjunctivæ*.

Page 400, 401.—*Black cataract.*

The second volume of Ammon's *Zeitschrift*, part 2, contains an essay on black cataract, by Dr. G. H. Warnatz. It is a German version, in a more extended form, of the inaugural dissertation of Dr. Warnatz, *de cataracta nigra*, Leipzic, 4to. 1802. It contains a complete assemblage of the facts hitherto recorded on the subject; but it leaves the question respecting the existence of literally *black* cataracts just where it was before. P. 295—324 and 411.

Congenital cataract.

I have stated, at page 444, that I had not seen the disease sufficiently early to enable me to state that it is strictly congenital. In a recent number of his interesting *Journal of ophthalmology*, Professor von Ammon has recorded some cases, which not only remove all doubt on the subject, but also elucidate the pathological anatomy of the affection.*

Case I.—The eyes of a female child were observed by the midwife to have a dull appearance immediately after birth. The child was consequently shown ten days afterwards to **Von Ammon**, who found a lenticular cataract in each eye. It died at the age of eight months, and the eyes were examined. The capsule was perfectly transparent in both. The lenticular substance was gelatinous, opaque, and large, with some firmer semi-transparent portions here and there. No trace could be observed of red vessels or spots, or red colour of any kind in the lens or capsule. The retina, iris, and choroid, were perfectly natural.

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* *Die angeborne cataracta in pathologisch-anatomischer, in pathogenetischer und in operativer Hinsicht. Zeitschrift für die ophthalmologie*, vol. iii. p. 70.

Case II.—Professor Haase, director of the lying-in institution of Dresden, saw cataracts in the eyes of an infant born in the establishment, and gåve **Professor Von Ammon** an opportunity of examining them immediately after birth. There was a lenticular cataract in each eye; in the left, the lens exhibited the threefold division which belongs to firm cataract. In the right there was a soft lenticular cataract, with slight capsular opacity. The child died when four months old. In the right eye there were nebulous spots on the anterior portion of the capsule: portions of the lens, towards its middle, were opaque, but the circumference possessed its natural consistence and transparency, and the corresponding portion of the capsule was transparent. Four entozoa of the genus *Distoma* were found in the lens under microscopical examination. The capsule was transparent in the left eye. The centre of the lens, which had exhibited the threefold division, constituted an opaque and almost horny nucleus, while the circumference was transparent and of natural consistence. **Professor von Ammon** had two opportunities of examining congenital central capsular cataracts in the eyes of the fetus. Both were born about fourteen days before their time; one lived a few hours, and the other came into the world dead. The opacity was a central speck in the anterior portion of the capsule, without any elevation of surface: the opaque part was, however, thicker than the rest of the membrane. The lens in both cases was transparent, but of reddish colour.

Page 565.—*Amaurotic cat's eye.*

Case.—Robert Mason, twenty-three years of age, a spare youth, of delicate appearance, was admitted into St. Bartholomew's Hospital under my care in the summer of 1828, on account of impaired sight in both eyes. He said that he had enjoyed good health; that the sight of the left eye began to fail eight years ago, and is now very imperfect; that the right has become dim in the last nine months; and that the complaint has not been attended with any pain. The anterior chamber was unusually small; the iris dark brown, and sluggish; the pupil about the middle size, and of a dull grey, instead of the natural black colour. When the pupils had been dilated by the belladonna, an apparently concave opacity, of a grey or dull yellow colour, with small blood-vessels ramifying on it, was seen far behind the iris, in the very back of the left eye. A similar appearance was found in the right eye; but the opacity was less extensive, and no vessels were visible. With the left eye, the patient could merely distinguish light from darkness, while, with the right, he could read large print. He left the hospital at the end of a month, the means employed having been of no service.

Page 606; (third and fourth paragraphs.)

In the two following cases, fungus hæmatodes, or a disease equally malignant, occurred in the orbit as a separate tumour, which affected the eye-ball merely by pressure.

Case I. *Large medullary tumour in front of the orbit, extirpated; relapse of disease in the neck, and death.*—A man, thirty years of age, of good constitution and health, who was received into the surgical clinic of Heidelberg, in February, 1831, had a large tumour occupying the front of the right orbit, which had begun to grow nine years before. He had at this time an inflammatory affection of both eyes, with impaired vision. The left recovered; but the sight of the right became worse and worse, and was at last entirely lost. At the same time a small excrescence appeared between the eye and the lower lid, and gradually increased. It was as large as two fists when the patient came under the care of professor Chelius at Heidelberg. It was of a deep red, ulcerated at various points, and bleeding freely, even when slightly touched. The mass was extirpated in February 1831. Its structure was medullary or cerebriform, more consistent at one part, softer, to the consistence of jelly, in another; it was partly dark coloured, partly lighter. The eye-ball entire, but diminished in size, was found at the upper and anterior part of the tumour. The sclerotica was not perforated at any point, but it had become thick and hard at the entrance of the optic nerve. The cornea could be still distinguished, and a portion of the iris. The crystalline was shrunk and ossified, the ciliary processes still distinguishable, as well as remains of the pigmentum and retina. The optic nerve was considerably elongated and reduced in size, but healthy in structure. The healing process went on favourably, and the patient was allowed to leave the clinic in April. In September of the same year he was seen in excellent health, without any return of disease. Intelligence was afterwards received that this patient died from a swelling, which appeared in the lower part of the neck, and extended in front of the chest. [*]

Case II. *Medullary tumour in front of the orbit, extirpated; relapse of disease.*—A Hebrew girl, seven years old, struck the right side of the head against the ground in a fall, receiving no other injury than a slight graze of the skin, near the external angle of the eye. Three weeks after, a small swelling, not differing in colour from the rest of the skin, appeared on the middle of the right upper eyelid. This increased rapidly, and soon became reddish, instead of white, which it had been originally. It was twice punctured without any other effect than the escape of some clear blood. When the patient entered the surgical clinic at Heidelberg, eighteen weeks after the fall, the swelling was as large as a goose egg, deep red, with a shining surface, which exhibited numerous vascular anastomoses. It was moveable, and soft. It covered the eye completely, but there was no reason to suppose that the organ was involved, as the patient had been able to see a little, fifteen days before. The tumour was removed, together with the eye-ball, on the 13th of October, 1820. It was solid, of sarcomatous and medullary composition, in some parts even cartilaginous; it contained numerous vessels. In three weeks the cicatrisation was nearly completed, but in the fourth week a small tumour showed itself near the internal angle of the eye, and increased so rapidly, that it was again removed on the 27th of December. It was now discovered that the tumour extended through the orbital parietes towards the nose. In a few days the growth reappeared; but the termination of the disease was not known. [†]

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[*] *Dissertation sur le fongus médullaire de l'œil; thèse présentée à la faculté de Médecine*, &c. par F. Bauer, Paris, 4to. 1830, p. 41—44. The external appearance of the swelling is represented in plate ii. fig. 1.

[†] *Lib. cit.* p. 45—48. Plate ii. fig. 2.

THE END.